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DYESTUFF REPORTER

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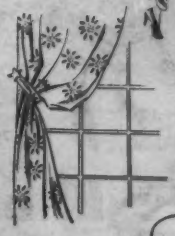

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AMERICAN
DYESTUFF REPORTER

VOLUME 28 JULY 24, 1939 NUMBER 15

Modern Printing*

G. HASSE

* *This is a paper presented before the Manchester Section of the Society of Dyers and Colourists and printed in its journal of January, 1939. Being a reprint from a British journal it mentions a number of dyestuffs and textile chemical specialties by their British trade names, which in many cases are the same as those under which they are sold in this country.

IF an attempt is made to give a summary of the development of the essential printing styles over a period of about 10 years, it is necessary to consider the different factors influencing the choice of those which are now in use. These factors are of technical and commercial significance. The technical influence is exercised by the quality of the material, by the suitability of the dyes and the machinery of the printworks. The commercial influence is that of fashion and fastness, and controls the costs.

This inquiry may first be directed to the methods of direct printing, in which, on the one hand, quiet times of few developments are discerned, followed by periods of rapid change. The quiet period is remarkable for the fact that all printed goods have been produced with dyes of one single range, irrespective of the number of the colors in the pattern. The opposite period of the movement shows patterns containing representatives of nearly as many dye ranges as printed colors. This different development is dependent, to a great extent, on the dyes available, and it can be expressed in other terms. The quiet time is one of complete dye ranges, while the period of what may be called "mixed prints" is represented by the appearance of new dye ranges, which are for the moment incomplete.

Almost every chemist will agree that at present there is a wave of the development of mixed prints. It may be considered that one-half of today's direct prints on cotton, rayon and spun viscose rayon, are composed of several dye groups.

Alongside the vat dyes, there may be found azo compounds of different types. Azo dyes of different compositions are used in conjunction with chrome dyes, leuco-esters of vat dyes, and aniline black. These mixed prints illustrate another variety, according to the way in which the azo dyes, and, for example, the leuco-esters, are applied to the fiber.

Starting from the assumption that at present there is a state of transition from more uniform lines of printing to mixed styles, it is necessary to investigate the reasons that lead away from the older processes in use to the newly introduced methods, e.g., the influences that give to the vat dyes their extraordinarily strong position in direct printing. First of all, there is the high fastness of these dyes that reserves to them a good number of articles, e.g., shirtings and limbrics. There seems to exist a certain kind of monopoly of vat dyes for shirt printing. However, their strong position has been successfully attacked in recent years, owing to the development of a fashion on the Continent whereby printed shirtings in bordeaux and deep helio shades are demanded. These shades could only be obtained at one period by the use of a very high percentage of vat dyes, but chemists soon discovered that the same shades could easily be printed with Rapidogen dyes of medium concentrations. Very quiet colorings appear to be produced on limbrics in this country, and vat dyes hold a very strong position for printing this kind of material. On the Continent, however, it is very difficult to get patterns of muslinet, i.e., the corresponding Continental material, printed with these dyes, as such goods are chiefly reserved for the naphthol styles. This is due to the influence of a different fashion.

It may be mentioned that the application of vat dyes in printing shows very little change in comparison with, for example, the application of the naphthol range, since most of the former are still printed with potassium carbonate and sodium sulfoxylate-formaldehyde; the use of soda ash or caustic soda in place of potassium carbonate is exceptional.

A point of interest is the printing of half-shades in multi-color designs in order to double the printed shades. A printing paste for this style, consisting of titanium dioxide, albumen, and gum tragacanth with an addition of Peregal OK, is printed with the first roller, and the succeeding rollers in the pattern fall partly on the resist-printed spots, thus giving the half-tone effects. The same process may be carried out with screens.

A reason similar to the selection of vat dyes for limbrics

because of their colorings, applies with force to the use of chrome dyes for furniture styles. The dull, dark shades of a print with chrome dyes are not easy to imitate with another dye range, especially in respect of costs. The same conditions for these styles existed in Germany until quite recently, when cotton cretonnes were replaced by a spun viscose rayon material of different character. The field is now open, therefore, to vat and Rapidogen dyes.

As regards the naphthol range, a simple perspective similar to that with vat and chrome dyes is not to be found. This may be due to a certain lack of tradition in the case of the naphthols, but more certainly the reason is to be found in the great variety of methods of application.

The print-on style of diazotized fast bases and fast color salts on naphthol prepares, shows a good number of supplementary dyes. In addition to basic, chrome and vat dyes, which are not largely used in this printing style, there is to be found the important range of Indigosols, members of which are printed by the nitrite process, which is the most frequently used method for print-on styles. Vat dyes are not easy to combine with fast salts, because the latter are sensitive to the reducing agent used. An exception is provided by the Variamine dyes, which are used in several ways.

The Rapid Fast dyes have the advantage that they are developed by neutral steaming, but they have been neglected in favor of the Rapidogen dyes, as Fast Blues and Navy Blues are lacking in the former range.

Recently, another new type of naphthol dye has been provided for the printing trade; its use depends on the ingenious idea of "solubilizing" the ready-made naphthol dye in the manner of an ester compound. Thus, a new scarlet of this type is more comparable, from a chemical point of view, with a Soledon than with an azo dye, but there is a fundamental difference in the manner of development. Whereas all processes of developing leuco-esters of vat dyes require an acid medium, the new dye is converted into the insoluble coloring matter by alkaline treatment.

The last group of naphthol printing dyes, viz. the Rapidogens, are widely used for direct-printed articles. Today, 6- and 8-color designs are a common style on cotton, spun viscose and other rayons, both in machine and screen work. Generally the Indigosols are used alongside the Rapidogen dyes.

It may be of interest to refer here to the profitable use of the Indigosols. It is known that the price of these leuco-esters is considerably more than that of the corresponding vat dyes. On the other hand, the different method of development makes it possible to use leuco-esters profitably up to a certain depth of shade. A most important difference exists between the yield of a vat color when fixed from a vat or developed from a leuco-ester respectively. It is not known exactly what percentage of vat color printed with potassium carbonate and sodium sulfoxylate-formaldehyde is fixed on the fiber. In the present author's opinion, it is a lower percentage than is generally believed; perhaps a yield of between 70-80 per cent is attained. A similar position arises with regard to the use of potassium carbonate and sodium sulfoxylate-formaldehyde. Printers use a considerable excess of the last two products for the security of the working of this printing style.

The developing process for leuco-ester prints by the nitrite or the sulfocyanide process, fixes the leuco-esters before the formation of the final dyes. When the conditions are well controlled, the yield is very near to 100 per cent. Also there is the difference of cost between the nitrite method and the sodium sulfoxylate-formaldehyde and potassium carbonate method. Summing up these points, the Indigosol printing paste is cheaper to a certain degree owing to the absence of potassium carbonate, sodium sulfoxylate-formaldehyde and glycerol, and also on account of the better yield of dye. This effective difference can be balanced in practice by using a larger quantity of the Indigosol dye. These considerations, represent practical advantages to be gained by the use of leuco-esters.

Two of the many methods of developing leuco-esters are chiefly used alongside Rapidogen dyes, viz. the chlorate and nitrite processes. The printing of Indigosols with chlorate and sulfocyanide has the advantage that both Indigosols and Rapidogen dyes are developed by acid steam. Many printers prefer the nitrite method as it gives a better yield, e.g. with Indigosol Green IB, the nitrite being decomposed by the acid steam. The steamed goods are padded with 1-2 per cent sodium nitrite solution and immediately dipped in dilute sulfuric acid. The quantity and temperature of the latter should not be too high, because the Rapidogen type dyes can be partly removed from the fiber. These dyes are generally printed with starch-tragacanth thickening, as it gives a good yield, but as the levelling properties of the printing paste are not always satisfactory, it is preferable to increase the quantity of tragacanth and use a smaller amount of starch. Solvitex ST and Caragheen-moss are also suitable as well as British gum that has not been too much converted; the latter thickening generally gives a poorer stability of the printing color, but, if the printing colors are used within 3 or 4 days, British gum may be used. The choice of thickening depends also on the size of the printed article.

It has been the desire of printers for a long time to print vat dyes alongside Rapidogen dyes, but unfortunately the leuco-compounds of the former are sensitive to the action of acid steam. It is possible now, however, to fix Rapidogen dyes by neutral steaming. The new process is effected by the addition of a volatile basic organic solvent, termed Rapidogen Developer N, to the printing color, which need not contain caustic soda, although this has a very favorable effect when printing spun viscose and other rayons.

The printed goods are fixed by neutral steaming for 5 minutes and require, for after-treatment, only rinsing and

soaping. At present, 15 Rapidogen dyes can be used for this style. It is scarcely necessary to emphasize the importance of this Rapidogen-vat dye style to colorists. At all events, in future, many printworks will be able to use these dyes without the necessity of the acid steaming technique which can only be carried out satisfactorily in an ager made of stainless material.

As Rapidogen dyes and vat dyes are mentioned together, this suggests a comparison of both these groups in practical printing. It has been proved that the former give level prints on difficult material, e.g., crepe goods, viscose rayon satins, etc., without the use of a starch roller. This means a better yield and brightness than can be attained by vat dyes.

Recently, very tight and smooth cuprammonium crepe fabrics made in the United States have appeared on the Continent, and, when printed, they illustrate the degree to which machine and screen printers make use of the good levelling properties of the deep shades given by the Rapidogen dyes.

This short review of naphthol printing styles in comparison with the printing methods for basic, chrome, and vat dyes, strongly supports the opinion that the present time is the middle of a period of "dispersion" in printing methods. Four different groups of dyes of the naphthol range are now available for the printer, one of which has only been on the market for a short time; in addition, there is a valuable new method of development for the Rapidogen dyes, so that it is now possible more than ever before to combine naphthol dyes with other dye groups.

A different method of printing is discussed next. The methods already mentioned depend on the fact that a soluble dye is fixed on the fiber, or, at least, the dye is solubilized in the course of the treatment of the printed goods, as in the case of vat dyes. In the pigment printing process an additional fixing agent is added to the insoluble coloring matters. Textile pigment printing has been for a long time synonymous with the printing of linings, and it is only in the last two years that this old craft has become important again for matt effects in fashionable styles. The matt prints are generally produced with titanium dioxide or zinc oxide fixed by albumen, sericose, Appretan A or Mowilith H. A very good method for this style makes use now of titanium dioxide in conjunction with Appretan A, albumen and hexamethylenetetramine. The prints are remarkable for their soft handle, and the printing colors may be tinted with direct dyes or with finely dispersed vat dyes. These matt effects are suitable for all-rayon material and are printed alongside vat, Rapidogen and Celliton Fast dyes.

A similar process was developed in recent years for stencil work in which the pigment was fixed by cellulose nitrate lacquers. Owing to the slow printing method, however, the output of these lacquer prints was small, but, for the period in which they were in fashion, the work was profitable, the more so as the plastic luster effects could not be matched by machine or screen printing. The thinner goods, e.g. voile and georgettes, are printed on glass or metal sheets, because the dried lacquer is difficult to remove from the back grey. The process has its own special difficulties, e.g. insufficient adhesion of the printed effects to the cloth and the tendency of comparatively large effects to break after drying. These difficulties can be overcome by mixing the colored lacquer, e.g. Kasara Finish for Cardboard, with alkyd resins and plasticizers. Associated with lacquer prints are the so-called dust prints, which are produced by means of white or colored Kasara Cardboard Finish. The moist prints are strewn over with viscose dust, which can be previously colored with direct dyes.

Whereas these methods of lacquer-printing are limited to the production of special effects, pigment printing has not been successful in bulk work on roller machines. This is due essentially to the insufficient fastness of pigment prints to soaping and rubbing. The interest of the machine printers in this matter is clear; after printing, every after-treatment, e.g. steaming, developing, and soaping, can be avoided and consequently cheaper production is to be expected. This matter has been pushed forward in the United States, and ready-made printing pastes are available now. The finely dispersed pigments, e.g. vat dye powders, are mixed with fixing agents, e.g. cellulose nitrate lacquers, and certain cellulose derivatives dissolved in organic solvents. The printing machine used is modified so that the process is similar to paper printing, from which this new method was derived. The modification includes a shallow engraving, such as that produced by photographic engraving, and the printed goods are dried on cans at a fairly high temperature in order to obtain sufficient fastness to rubbing. Machine lacquer printing is especially suitable for tight and smooth materials, e.g. satins, taffetas, etc., whereas the small amount of printing color from the light engraving does not sufficiently cover goods of a rough texture, e.g. cretonnes, crepes, etc. At present, the cost of a good print with vat pigments is no less than another produced with the same vat dye by the ordinary potassium carbonate and sodium sulfoxylate-formaldehyde method including the finishing processes, e.g. ageing, developing, etc. Nevertheless, the process is the beginning of a printing technique quite different from the old methods.

The last point to be discussed under direct printing is concerned with cellulose acetate rayon. This fiber is of much more importance in England than in other countries where it is only printed on a small scale, for high-class work. Owing to its special properties, there is not much scope for the selection of different dye groups. The Celliton Fast and analogous dyes give clear prints in a good number of shades, but it is not easy to attain with the printing roller or with the screen on cellulose acetate rayon, the brightness of acid dyes on silk. Nevertheless, colorists have always aimed at this standard, because the practical use and price of cellulose acetate rayon materials

(Continued on page 397)

The Processing of
Acetate and Viscose Rayon Fabrics

Part VI—The Bleaching and Dyeing Operations for Acetate Rayon Flat Goods

C. B. ORDWAY, M.S.

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(Continued from March 6, 1939, issue)

DIRECT DYEING ACETATE RAYON COLORS

THE direct dyeing and developed acetate rayon dyestuffs used on a jig must be selected with greater care than dyes run on crepes in a box or dye-beck.

In testing dyes for jig work, the following properties are stressed:

1. Uniform and full rate of exhaustion at 150-160° to 190-200° F.
2. Level dyeing.
3. Easily dispersed or "soluble" type.
4. High stability in concentrated dye-bath over an 8 to 20 hour dyeing period if necessary.
5. Resistant to acid fading.
6. Free from crocking.
7. Free from subliming.

Acetate rayon dyes are entirely distinct in their dyeing action on the acetate rayon fiber from that of other types of dyes in vegetable or animal fibers. They possess a dyeing affinity in and out of the dye bath and this property must be carefully observed in jig dyeing. Dyes must be selected that possess similar rates of exhaustion at the same temperature range as nearly as possible.

You can obtain good level dyeing if you use a color combination that has three dyes in the formula, all that exhaust at 160-200° F. The dye combination must be either fast or slow, and the best results are obtained only when this point is observed.

A direct dyeing acetate rayon dye may be run at 180-200° F. and the goods will pass through the dye-bath in 10-20 seconds while they will be batching on the roll 12 to 20 minutes. The temperature during the batching of a roll will be from 20-30° F. lower than the dye-bath but the acetate rayon dyes are being exhausted in the batching operation the same as when the goods pass through the dye-bath. This illustrates why it is so important to have dyes possessing the same rate of exhaustion at a given temperature range on the jig.

The dye-bath for the direct dyeing of acetate rayon dyes on a jig varies according to the weight and quality of goods being processed as shown by the dye-bath methods No. 1 to No. 4. (Part V.)

The lightweight goods can usually be dyed in shorter time and with less dyeing assistants than the heavyweight goods.

On the heavyweight goods, the use of a very stable penetrant is quite helpful as the shades cannot be exhausted as rapidly as on the lightweight goods or they become streaked. The heavyweight goods require slower exhausting colors than the lightweight goods so as to obtain better penetration and level dyeings.

Where shades become streaked on acetate flat goods and cannot be leveled by adding color slowly, it is best to drop all or part of the bath and run the goods in an olive soap bath with a stable penetrant 4 to 8 ends at 180-200° F. This soaping action of olive oil soap has a solvent action on acetate rayon colors that helps to strip off excess color. Then the use of a penetrant allows uniform "stripping" action of the color. After a shade has been leveled, the dye additions can be made to bring it up to the desired shade.

In the dyeing of pastel shades, it is advisable to give the goods a heavy scour such as Boil-off Method No. 3 and a half-bleach by the peroxide method before dyeing the shade. These precautions will help to insure a uniformly dyed roll from selvedge to selvedge and end to center piece. If the greige goods have been classed as "whites," the heavy scour may be eliminated and a light scour substituted for it.

The use of phosphate compounds helps to solubilize the acetate rayon dyestuffs, but it is best to keep the pH of the dyebath between 8.5 to 10.

All dye additions must be made with the steam shut off and the dye properly prepared and strained. On light shades it is best to make a dye addition over 4 ends while on medium to heavy shades it can be entered in 2 ends.

Shades must pass the crocking or rubbing test after they have been approved for shade. If an A.A.T.C.C. Crock-meter is not available clamp the dyed cloth to a table top and rub ten strokes, using desized white sheeting as the testing cloth.

If the goods show any crocking they require further washing with hot bath, using pyro phosphate and a sulfonated fatty alcoholate until the crocking test shows clean of any staining.

The goods are usually given an acid finish and then run onto the shell ready for finishing and drying on the Palmer.

THE DEVELOPED ACETATE RAYON DYES

The developed acetate rayon dyes must possess better working properties for jig work than similar dyes used on dye becks. Only a portion of developed dyes

which may be used in dye-becks will give good results in jig dyeing.

Jig dyeing developed dyes must possess similar properties as the direct dyeing acetate rayon dyes and special emphasis should be given to developed blacks and navies, free from crocking and sublimation.

With developed dyeings which are chiefly black and navy, the boil-off operation is not always as carefully worked out as with direct dyed shades. However the goods should be scoured and inspected with the same care on these heavier dyeings as on lighter shades. A developed black or navy will not cover up oil spots or blotches if the fabric has been poorly scoured.

The dyestuff must be prepared properly, dispersed, strained, and entered in 4 parts with steam shut off. There should not be any *boiling up* of an acetate rayon dye.

The newer types of developed acetate rayon blacks and navies can be sampled and given a laboratory diazotizing and developing test on the eighth or tenth end. These dyes are more rapidly exhausted than older classes. This allows the dyer to check as to accuracy and the exhaustion of dyebath. After the goods have been run a sufficient number of ends, they are given several hot washes, and then given a crocking test. Goods properly rinsed free of surface dyestuff before the diazotizing and developing operation will usually pass the crocking test after being properly developed.

DIAZO BATH

The goods as well as the dye liquor in the jig must be cold before starting the diazotizing operation. It is best to keep the diazo bath at a full volume of 80 gallons, otherwise the pieces on the outside ends may receive too rapid a diazotizing action.

The nitrite of soda should be added first to the diazo bath then add the acid, dilute, and mix thoroughly before starting up the jig. The addition of one-half of these chemicals per first and second end gives best results and this is specially true on larger size rolls of a 1,000 yards or more.

pH determination and potassium iodide starch paper tests should be made at the start, middle, and end of the diazotizing bath.

(See Figure 36—Glass Electrode pH Determination Apparatus.)

Plant experience has shown that a pH range of 1.4 to 2.2 will give consistent results. The potassium iodide starch paper will indicate whether the chemicals are in proper strength and if it is necessary to make a chemical addition or not. It is important that the goods not be allowed to run in a "dead" diazo bath or over-diazotized by giving too long a period in the diazo bath.

The operative must not "finger" or handle the goods during the diazotizing or developing. This leaves fingermarks on the finished goods.

After the diazo bath is dropped, several cold washes are given to rinse the acid from goods so as to prevent uneven development.

Fig. 36—Glass Electrode pH Determination Apparatus.

Courtesy, Wilkens-Anderson Co.

DEVELOPMENT BATH

The BON can be prepared by dissolving with either caustic soda or ammonia and then strained into a jig cold. Using BON prepared by dispersing it with sulfonated fatty alcoholates does not give satisfactory results on jig work. The BON falls out of dispersion and a large part of it is lost for developing purposes.

Dilute acetic or formic acid is added directly to the cold BON bath until it turns milky and shows acid to litmus. The pH range for the developing bath should be from 3 to 4 and the bath must be kept on the acid side during the entire development operation.

There are varying opinions as to the best method to run the different ends for a developing bath. Some dyers like to increase their developing temperature by "steps" of 100-120-130-140° F. Others prefer to start at 100° F. and then raise the bath to desired temperature (130° or 140° F.) and holding it there the remaining number of ends.

The "step" method of increasing temperatures gradually requires slightly longer time and more careful checking but usually gives the more consistent results from lot to lot.

Development bath volumes are reduced usually to 40 to 60 gallons; this permits a quicker development in a concentrated bath and helps to secure full benefit on the BON used. The dianisadine blues appear more sensitive to changes in the BON volume and temperature than the blacks.

After the shade is fully developed and approved, the bath is dropped and the dyed goods are given a hot rinse with a sulfonated fatty alcoholate and tested for crocking and sublimation.

The sublimation test is to iron a wet piece of the dyed goods between two pieces of desized white sheeting. If the goods do not sublime then there will be no stain on the white cloth.

Sublimation is a fault with many of the developed acetate rayon dyes that a dyer usually cannot correct even though every precaution has been taken during the dyeing operation.

Some plant chemists claim that the preparing of a dyestuff by boiling it up may cause tarry particles to collect and these will cause sublimation. Others state that dyeing above 180° F. will cause a color to sublime. The drug room workers will continue to boil up colors lightly,

and temperatures above 180° F. are required to penetrate heavy goods. A dye that has a subliming tendency will be aggravated by the dyeing methods sometimes used and therefore show up worse on some dyeings and methods than on others.

The newer types of developed acetate rayon dyes possess higher dispersing (solubility) action, quick exhaustion at 160-180° F., and more rapid development in BON bath than older types. Some of these dyes show a wide divergence of dispersion action when prepared with olive soap or sulfonated fatty alcoholates and the rate of exhaustion as well as depth of shade is affected by the type of dispersing and dyeing agent used.

The rinsed developed shade is given an acetic or formic acid rinse at 120-140° F. and run onto a shell for drying and finishing operation.

Many plant chemists and dyers have found it economical of time, chemicals, and dyestuffs to have sets of standard operating procedures prepared showing the different chemicals in the boil-off and dye bath formulas on the various qualities of flat goods that they are called upon to bleach, dye, and finish. By setting up these standard procedures and having them given a code number, the overseers in charge of the jigs and the drug room can refer to them quickly; this insures rapid and accurate work in handling many types of fabrics with all types of dyeing and bleaching methods.

On the standard dyeing instruction sheet the dyer can state standard procedure No. 1-T, direct dyeing acetate rayon shade and finish, and make notations as to any exception to the special standard procedure that he may wish to use on preparation, boil-off, dye-bath, or finishing operation.

A dyer may have a very economical and satisfactory boil-off and dyeing formula suitable for light weight acetate rayon taffetas that are classified as "whites" or "slightly soiled" by the greige cloth inspection department.

The plant will receive a large dyeing order for this quality of goods but the cloth inspection departments notifies the dye house that the new lot of goods is very oily and soiled and may show only 25 per cent first quality "whites" and the remainder are heavily soiled and oily.

On checking over the dyeing orders, the dyer finds that the shades show 50 per cent light, 25 per cent medium, and 25 per cent dark shades. The dyer must make a decision promptly and he decides to use two or three different types of boil-offs such as Methods No. 2 or No. 5 for the greige goods classified as whites or slightly soiled and Method No. 3 for goods classified as heavily oiled and soiled. (See part V—for these methods). Method No. 3 would primarily be used as a scouring medium as preliminary to bleaching but it will also give good results in cleaning up oily and heavily soiled goods. The plant does not have time to wait for laboratory tests and small lots to be tested on the jigs to find a cheaper method as to chemicals required. Investigations are always worth while but it is best to use a "proved" and fool-proof formula on troublesome goods than to be continually carrying out experimental studies on full size lots that require rush and economical handling.

STANDARD PROCEDURE NO. 1

Standard non-automatic or automatic jig
80 gallon volume—200 lb. goods

Thread goods over (outside) one or both expander rolls and run thru the cold water and preparation. Re-thread under expander rolls on addition of boil-off and run for subsequent operation. (See Dye Sheet)

Bleach White—Peroxide Method

Preparation—Light weight goods
1 End run goods off shell onto jig—dry
2 End run thru cold water—(taffetas)—drop
2 End run thru warm water—(satins)—drop
2 End at 90° F.—enter prepared enzyme
2 End at 120-140° F.—drop
1 End hot rinse—180° F.—drop

Boil-off—Enter materials
1.5 lb. tetra sodium pyro phosphate
1.0 lb. sulfonated fatty alcoholate
2.5 lb. low titer soap

Preparation—Heavy goods—(Same as light weight goods)

Boil-off—1.5 lb. tetra sodium pyro phosphate
1.0 lb. sulfonated fatty alcoholate
6.0 lb. low titer soap
6-8 Ends 200° F.—drop
2 Ends hot rinse 200° F.—drop—ready for bleach

Bleach Bath—80 gallon volume—Prepare as follows:

Light weight goods
3 quarts 100 volume—Hydrogen peroxide
2 pints Sodium silicate
0.5 lbs. Sulfonated fatty alcoholate

Heavy weight goods
4.5 quarts
3.0 pints
1.0 lb.
6 Ends—175° F.—Bleach bath—Light weight goods
8-10 Ends—175° F.—Bleach bath—Heavy weight goods
Drop

Check pH and peroxide content of bath at the start and end of bleach.

2 Ends—hot wash at 160-180° F.—drop

Tinting Bath—
4-6 Ends 180-200° F.—sample on 4th—check with standard
0.2 lb. tetra sodium pyro phosphate
1.0 lb. sulfonated fatty alcoholate
1.5 gram acetate Violet B

Finish—
2 Ends at 120° F.
½ pint formic acid or 1 pint of acetic acid—28%

See dye sheet for special finish to be given on jig—otherwise run onto shell—on last end.

(Continued on page 397)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

JULY 24, 1939

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Problems Confronting the Yarn Dyer Today*

THOMAS R. SMITH**

THERE is today a greater demand for dyed cotton yarns in the knitting field than probably at any time in the history of the industry. Just why this should be the case is due mostly of course to consumer demand, but the fact that dyed yarns have been improved to the extent that they are softer and more evenly dyed, thereby making it possible to produce knitted fabrics of superior quality, has in no small way contributed to this condition.

In the meantime the dyer's duties have become more and more complicated. The user of dyed yarns has become more particular and his demands more exacting. To begin with, the dyer is expected to keep the customer satisfied, regardless of whether the customer makes any mistakes himself or not. The customer may not send in the correct sample to be matched and the natural result is a complaint. I would like to point out here that the buyer or user of dyed yarn has a responsibility in the transaction to which he should live up in being as careful and helpful as he possibly can. The problem is a mutual one between spinner, dyer and user, whether he be knitter, weaver, or any other manufacturer of fabrics.

The practice of knitting flat stitch fabrics of solid colors magnifies the imperfections in both spinning and dyeing, thereby showing up unevenness that might otherwise pass unnoticed if the yarns were to be used in stripes or for patterns that are broken up.

When we consider the problems that the dyer must face today a book could be written on the subject. Practically every factor involved is a variable. The cotton or other raw material varies. The yarn, the water, the dyestuffs, the chemicals and the efficiency of the machinery are all subject to variation. Therefore, the controlling of these variable factors becomes a very important matter.

In order to bring about a system of control that is as near fool proof as possible it is wise to eliminate as much chance for human error as we can. The use of automatic temperature controls will most certainly prove of benefit in this case. These devices have been considered too expensive by a great many, but they are in reality cheap when you compare the cost of the control to the cost of the machine and the value of each lot of dyed yarn that is to be controlled. For instance, you may have a dyeing machine that costs say three, five or ten thousand dollars. The best control that you could possibly install on this machine will cost only about $175.00. Every lot of yarn dyed in the machine would have a value almost as much or more than the $175.00 investment for the temperature controller, but it is hard for the dyer to convince the management of these facts.

Now why should it be hard to convince the management or executive heads or treasurers or purchasing agents or whoever has the say in the purchase of necessary equipment and supplies? The answer in a great many cases is false economy, the inability to see anything but first cost. However, a lack of knowledge of the problem is probably the best answer.

Dyeing and processing appears as a very mysterious subject to a great many executives. In a great many cases they are too busy to give the problem the attention that it deserves. You would think that they would have enough curiosity to want to know the whys and wherefores, or in other words what makes the place tick.

If the management would get down in the dye house and attempt to find out about the various things, get a real understanding of why stainless metal is worth the additional price over the cost of cast iron for instance, and give the dyer the benefit of his business experience and organizing ability, one of the dyer's greatest problems would be helped. Of course, there are a great many executives who do have a thorough understanding of the things I have just mentioned and do help their dyers, but there are some who do not; and it is well to point out the importance of this factor in any discussion of the problems confronting the dyer.

One of the greatest problems the dyer has to face today is that of securing accurate technical information concerning the application of dyestuffs and chemicals. No up-to-date text-books have been published within the past 20 years. Of course, new products and new methods have been introduced so fast that it would have been difficult to keep literature constantly up-to-date. Our own Association through its research work has helped a great deal along the line of establishing standard tests and in cataloging or listing dyes, chemicals, dyeing assistants and specialties, but I would like to see more applied research carried out in order to help the dyer with his problem today. Fundamental research is absolutely all right and should be carried right on without curtailment, because fundamental chemical research is responsible for our industry's existence today. Without it we would still be using vegetable colors and the dyeing would be carried out in our back yards or in the wood shed. But research work which would definitely establish the fact that one method of processing or application is better than others would remove the element of doubt so often in the dyer's mind.

*Presented before South-Central Section, January 28th, 1939.

**Wiscassett Mills Co., Albemarle, North Carolina.

About two years ago I suggested to the Piedmont Section that we should set up a Sectional Research Committee to carry out research work and offer technical advice to our members. This suggestion did not seem to receive a very enthusiastic reception so I did not press the matter. Just why this idea did not go over I do not know. It may be that some of us think we have a lot of secrets and are not willing to let the other fellow in on them. But the chances are that the man who tries to keep all these secrets builds a wall around himself that excludes a lot of outside information that might be very helpful to him.

With reference to the application of dyes, solubility is one of the first requisites that the package dyer especially must consider. In skein dyeing and warp dyeing this is not of such great importance, but in order to exhaust colors properly and uniformly, soluble dyes alone should be used. Sulfur colors as a class are probably the package dyer's greatest worry and if possible should be replaced by other types.

The term "fast color" is undoubtedly the greatest misnomer ever devised by man. There is probably only one absolutely fast color and that is Turkey Red. The rest are fast to certain things or fast to a certain extent, but when a customer asks for a vat or naphthol color of very heavy depth and insists that it be free from crocking he has demanded a great deal. The color may be fast to washing, of course, but when the user tests the color by rubbing with concentrated soap between the hands in a wash basin the color invariably bleeds. The problem of educating the customer to what he can expect is one that deserves a lot of attention. The customer should be informed that it is impossible to match all wool or silk colors with the same degree of brightness on cotton, and also he should know that vat shades cannot be reproduced with the same brilliancy in developed colors or at least not so in every instance. There are exceptions to this.

To place your finger on the cause of a certain imperfection in dyeing or lack of uniformity is very often impossible, but in many instances the dyer is held responsible. The quality of the yarn is of utmost importance. Cotton of different grades, off shades, etc., contributes to the problem of uneven dyeing, and of course uneven mercerization can do a lot of things. However, I would not like to say too much about that in Chattanooga. The mercerizers have undoubtedly all improved quality within the past 10 years.

This question of cotton and also uneven spinning can certainly play havoc with a piece of knitted fabric.

Dirt or smoke in the air is one of the most difficult nuisances with which we have to contend, especially here in Chattanooga and other industrial cities. In order to analyze this trouble we must go back to the spinning, because coal soot picked up on the spinner bobbin will show up in many instances after the yarn is bleached or dyed. Light bleach base colors will not cover up these little black marks, so we have a problem of air conditioning added to the many others already mentioned.

The necessity of good water is well known, of course. Lack of minerals and hardness and a pH of 7.8 to 8 for cotton dyeing are best. The water in a dye plant should be checked every day for any variation.

I have always contended that the greatest problem with which the package dyer has to contend is mechanical, —the maintenance of the machinery involved. It is of paramount importance that the master mechanic and mechanical force give the dyer absolutely perfect cooperation. It is well if the dyer is mechanically inclined and has supervision over the upkeep of the machinery also.

These problems discussed are only a few of the most important ones. Every dyer has his own individual ones that occur daily with which he has to contend.

OUTING, MID-WEST SECTION

THE ninth Annual Outing of the Mid-west Section was held on June 17, 1939, at Lake Lawn, Delavan, Wisconsin. Luncheon and dinner were served, and the meeting was called to order at 8:30 P.M. by H. Boxser. There were 94 members and guests present.

Mr. James Morrison and his Committee did admirable work handling the outing in smooth and orderly fashion. They received a rising vote of thanks. There were fifty-two prizes awarded. The donors of same were sent letters of appreciation.

Mr. James Morrison, in behalf of the Allied Trades, awarded to the Association two traveling golf trophies to be known as the Salesmen's Cup and the Salesmen's Trophy. These will be awarded to millmen (members in good standing) each year, and shall remain in the winner's possession for one year until one man has won the trophy three times. The three-times winner shall retail permanent possession of the cup or trophy. The Salesmen's Cup shall be awarded for low net score, and the Salesmen's Trophy for low gross score at the Annual Outing.

Mr. C. L. Mendelert was awarded the Salesmen's Cup, and Mr. Art Patton the Salesmen's Trophy.

Mr. H. Boxser thanked the Allied Trades for the trophies.

First and second place winners in each class in the golf tournament were as follows:

1st Low Gross—Class A—E. Smith.

2nd Low Gross—Class A—J. Morrison.

Tie—Class B—C. L. Mandelert and H. T. Latham.

1st Low Gross—Class C—B. Remer.

2nd Low Gross—Class C—V. Hartquist.

Low Gross—Guest—Wilbur Mode.

The salesmen won the annual baseball game from the millmen—score 6 to 5.

Meeting adjourned at 9:30 P. M.

Respectfully submitted,

DAVID ANDERSON, *Secretary.*

Control and Prevention of

Mold and Bacteria Damage in the Textile and Allied Industries*

W. A. STRINGFELLOW**

THE activities of bacteria and fungi exercise a very important influence on our daily lives, and yet the average conception of these micro-organisms is usually fairly obscure. To a great many people the word bacteria brings to mind the picture of a germ, which in turn is conceived as some kind of bug which is invisible to the naked eye and which occupies all of its time spreading infection by means of its bite. If you are bitten and your resistance is good, the bug dies and you remain healthy. If, however, you are bitten and happen to have wet feet, are very tired or your resistance is otherwise low, you may contract a cold, influenza, the grippe or something worse.

Molds seem to be somewhat better understood. To some, the term signifies a special of growth such as toadstools, mushrooms, etc. Others may conceive a picture of the green material which sometimes grows upon bread. In general, however, most people associate the term mold with mildew, with which condition nearly everyone is somewhat familiar.

Molds and bacteria are not widely considered as being desirable, although actually, we could not get along without the activities of these organisms. Some of these activities are extremely essential to life and life processes, both plant and animal, and of course some are not.

We are principally concerned herein with the activities which are damaging as related to the textile and allied industries. The damage is caused by the growth or development of mold spores and/or bacteria with which the material or materials directly concerned have come in contact.

These mold and bacteria organisms are present in countless numbers in the air we breathe, the ground we walk upon, and the water we drink. They are carried about by air currents very often for considerable distances before depositing, as has been definitely proven by research investigations.

When these micro bodies are deposited on a favorable medium, under favorable conditions, they grow and multiply and can, after a period of time, cause considerable damage to the medium. Their nature and development may be such as will become visible to the naked eye, but very frequently, they remain entirely invisible.

The damage they inflict may consist of discoloration, tendering, decay or putrefaction, rancidity or odor formation, acidity or alkalinity development, or other effects detrimental to the processing or ultimate value of the materials under consideration. These effects may occur singly but more often appear in combination, i.e., discoloration is accompanied by tendering, etc. Damages which are visible or otherwise recognizable can be picked out readily and traced as to cause, but it should be kept in mind that there are many detrimental effects produced by the action of micro organisms which are not so easily traced, and as a matter of fact, are most often blamed on something else.

Textile fibers and fabrics, leather and paper are all favorable media for the growth and development of mold and bacteria organisms. Many of the products with which these materials are treated are also excellent media and increase the food source for the organisms. These include glues, gelatin, starch, gums, casein, wax, latex, oils and others.

It is almost impossible to prevent infection by bacteria and mold organisms, owing to their omnipresence as pointed out, so effort has been largely directed toward the prevention or control of their growth, since it is the growth which is responsible for damage. The principal method of control consists of regulation of moisture, regulation of temperature, adjustment of pH, and the use of chemical antiseptics.

It has been definitely proven that development of micro organisms is not possible without the presence of moisture. In the case of dry products, moisture is usually considered from the standpoint of relative humidity. Some organisms can grow in a relative humidity of 75 per cent, but most require from 85 to 95 per cent. When considering the moisture content of a product, it has been shown that if this content is kept below 8 per cent, growth is inhibited in the case of textiles. Micro organisms are not necessarily killed by this regulation of humidity or moisture content, because many can live through protracted periods of dry conditions, although they will not grow.

Temperature is also a factor in the growth of mold and bacteria organisms: The growth of most organisms is inhibited at a temperature of 125° F. The maintenance of a temperature above the maximum necessary for growth is, however, rarely practical and seldom used on this account. Low temperatures have been more frequently used

*Presented before South Central Section, May 6, 1939.
**Ciba Co., Inc.

as a means of control, inasmuch as they also will inhibit development. Low temperatures are more practical to maintain and the control is good, although many fungi will grow even at zero degrees centigrade.

The regulation of pH is sometimes employed as a means to control the growth of certain micro organisms since all of them exercise their activity within a limited range. By adjusting the acid or alkaline conditions, it is possible to inhibit development of these organisms.

In evaluating these methods it becomes evident, however, that it is not always possible and very rarely practical, to maintain conditions of moisture, temperature, or pH at the necessary levels to establish desirable control against the growth of the micro organisms. Consequently, the greatest amount of attention has been given to chemical means of inhibiting growth by the use of antiseptics. The term "antiseptic" is usually applied to a material which inhibits growth, while the term "disinfectant" generally refers to a material which kills organisms. Common practice includes disinfectants under the term "antiseptic," inasmuch as all antiseptics do have some killing power.

An ideal antiseptic for the textile industry has been defined by a number of sources, and we take occasion to repeat these qualifications.

(1) It must be sufficiently soluble to insure uniform distribution.

(2) It must be unaffected by heat, by metallic surfaces with which it comes in contact, and by any of the ingredients commonly used in size or other treating materials.

(3) It must not volatilize during the boiling of a size mixture or finishing paste, or the drying of the sized or otherwise treated yarn or cloth.

(4) It must have no appreciable color or smell and must not develop any color at slightly acid or alkalin reactions.

(5) It must not have any detrimental action on the substances to which it is applied. If used on a material which is to be subsequently colored or finished, it must not affect these processes.

(6) Its cost for equal protection should not be greater than that of zinc chloride to be generally useful.

(7) It should be reasonably simple to apply.

A great many substances have been investigated by numerous workers and advanced for use as antiseptics for the prevention and control of mold and bacteria damage in the textile and allied industries. Our investigations have dealt with a variety of products but have been primarily concerned with a group of chemicals having the trade mark designation "Dowicides" manufactured by the Dow Chemical Company of Midland, Michigan, and distributed by the Ciba Company, Inc.

Our experience has concluded that the field of preservation is so broad that no one material can meet the qualifications herein set forth under every condition encountered in practice. There is, therefore, a range of these products enabling a choice in the selection of one or more to give maximum control against bacteria or mold damage under any individual conditions. The Dowicides are chemically, halogenated and phenylated phenols and their water soluble sodium salts.

In the selection of a suitable antiseptic to control any individual condition or set of conditions, the following points should be borne in mind.

(1) What is the nature of the organisms against which protection is desired.

(2a) What is the degree of permanence required for the protection.

(2b) What factors of exposure which the preserved material will be required to meet, may effect this degree of permanence.

(3) How must the antiseptic be applied.

Mildew or mold is quite a common source of trouble in the cotton industry especially. Bacteria action also causes an appreciable amount of damage, but is not generally as readily recognized or identified. Bacteria damage is very frequently mistakenly considered as having been caused by mold or mildew conditions. It can be stated that very often a combined action by both mold and bacteria is exerted and this combined action can cause considerably greater trouble than the action of either individually.

In order to make a proper selection of an antiseptic, therefore, it is necessary to determine the cause of the damage as closely as possible. If the trouble has arisen from the activities of bacteria, an antiseptic having a high phenol coefficient would usually be indicated.

The term "phenol coefficient" is simply a measure which is universally used to describe germicidal efficiency of an antiseptic. The term describes the ratio of effectivity as compared with phenol in the killing of certain selected micro organisms. "Phenol coefficient" must not be taken as too exact a description of effectivity, however, inasmuch as conditions encountered in practice exercise a great influence on the effectivity. The phenol coefficient is determined under completely standard laboratory conditions and in industry of course, it is virtually impossible to duplicate these conditions.

If the damage is found to be caused by mold or fungi organisms, an antiseptic which possesses high effectivity against these organisms should be selected. Fungicidal effectivity is usually described by reference to the minimum concentration required to inhibit growth of standard organisms. This measurement can also be considerably effected by practical conditions. It, like "phenol coefficient," is a valuable initial guide, but should be accompanied by trials under actual working conditions.

In a discussion of point (2a) (degree of permanency), the period of time desired for the protection should be considered. Goods may be required to remain for a short period in a moist condition in a warm atmosphere, and

thereafter be subsequently processed and finished without exposure to conditions conducive to the growth of fungi or bacteria.

An illustration of this is cloth which is passed through the desize and plaited down over night. Hosiery remaining in the damp state over night before boarding is another illustration. Leather in the blue, and paper pulp are often required to maintain a moist state under conditions favorable to mold or bacteria growth for short periods, and should be protected for at least these periods.

The degree of permanence, on the other hand, may be required to be nearly absolute. Considering point (2b), it may be desired to maintain inhibitory conditions against the action of weather, washing, or other factors which might affect the protective qualities of the antiseptic. Articles requiring protection of this nature would be awnings, tents and other canvas products, curtains, billboard posters, etc. This type of preservation is very difficult to obtain or maintain. Antiseptics in themselves insoluble in water, are removed by the beating action of rain for example, or their preservative action is otherwise destroyed by the conditions of exposure.

We can report a specific piece of research work that we have conducted on the mold proofing of cloth which must remain mold proof for long periods of time under conditions of severe exposure. This applies to the field of awnings, tarpaulins, sail cloth, tents, etc.

In working on this problem, we at first tried to incorporate water insoluble fungicides in the cloth by impregnation out of solvent solutions. We found that, while fungicides incorporated in this way would withstand leaching action of water on immersion, they would not withstand the mechanical beating action of rainfall. It was, therefore, necessary to find some means of applying the fungicide that would insure its retention under the above conditions. The process that has been developed for this is as follows:

First, the treating of cloth by means of a water soluble fungicide so that the fungicide is contained on the cloth to the extent of 3 to 4 per cent. This is done by passing through an apparatus such as a pad or quetsch. This impregnation is given a nip through squeeze rolls, and without drying, is passed through a solution of basic lead acetate in a concentration which will insure the development of the lead salt of the fungicide in situ upon the cloth. The fungicide found to be of greatest efficiency in these practical tests was sodium pentachlor phenate which is transformed by the treatment into lead pentachlor phenate. This salt is peculiar in its characteristic of being precipitated within the cloth in such a form that it is not removed and indications are that cellulosic fibers exert a preferential adsorption for this lead phenolate. Duplicate experiments made with other metallic precipitations of the other members of the series show that the characteristic of retention is best exercised by the lead salt.

Our laboratory requirements for exposure conditions were that the impregnated materials must withstand the action of a twenty-four hour water spray without evidencing any growth of mold after subsequent inoculation and incubation. Tests according to these requirements have been made by several laboratories and results have checked satisfactorily. Field trials are at present under observation and results to date are altogther favorable. Full detail will be available on these when the trials are completed.

In conjunction with these experiments, a research was also conducted toward the preservation of canvas or other fabrics to which a coating of paint or similar material was applied. There is a necessity for the inclusion of a fungicide in the paint film, since the paint as well as the cloth will support mold growth. The results of this test work developed the fact that completely satisfactory protection can be obtained by the inclusion of Tetrachlor Phenol in the paint, which is applied to the cloth. That which is true in protection of a paint film may be expected to be true also in most types of coating as applied to cloth.

There can be mentioned a few of the various problems on the application of fungicides and germicides on which has been conducted research and practical work, which may be of interest.

Prevention of rancidity and odor development of soaked silk.

Control of bacteria and fungi damage to jute and jute products—canvas and canvas products—water proofing agents—paint and painted surfaces—pulp and paper products—hides and leather products—latex—adhesives—sizing and slashing compounds.

There has also been successfully demonstrated that cloth can be preserved against mold growth during the steep in connection with desizing operations. Mold proofing of car liners and insulation materials has also been successfully accomplished.

Many other diversified fields are becoming increasingly convinced of the value of mold, mildew and bacteria control, and we sincerely trust that this brief recital will serve to interest you in this subject.

OUTING, PIEDMONT SECTION

THE Piedmont Section held its annual Summer Outing at the Ocean Forest Hotel, Myrtle Beach, S. C., on Friday and Saturday, June 23 and 24, 1939, with three hundred and thirty present. There was golf, and bridge for the ladies, with prizes for both. At the banquet Saturday evening there was music by the hotel orchestra and an entertainment arranged by members of the Association. Later there was further entertainment and dancing in the Patio. Much credit is due the various committees for successful management.

Respectfully submitted,

J. W. IVEY, *Secretary.*

The Dyeing of Rayon Staple*

F. BONNET**

THERE are several types of rayon staple on the market today made by the various processes for producing continuous filament rayon, namely viscose, acetate and cuprammonium, but of these the viscose process produces by far the greatest poundage. Hence it is this type primarily which will be discussed.

Although the rayon staple is spun as a continuous tow with anywhere from 50,000 to over 100,000 filaments all essentially parallel, there is no way at the present time of handling such a rope of filaments to give the kind of spun yarn required.

Rayon staple is therefore nothing more than continuous filament rayon cut into lengths suitable for handling on cotton, wool or worsted machinery, which means fiber lengths of about 1½ inches for cotton processing, and spinning to 4 inches or more for wool and worsted.

At present practically all the rayon staple comes on the market in bale form just as cotton and wool does.

Spun rayon can, of course, be made in any filament size and cut to any desired length, but the 1.5 denier, 3 denier and 5.5 denier sizes have become more or less standard. The 1.5 denier corresponds to the average American cotton, the 3 denier to the coarser cottons like Peruvian for example or the finer wools, while the 5.5 corresponds to the regular wool and worsted fibers. Sizes like 7 denier, 10 denier or even 25 denier correspond to mohair and the coarser types of fibers.

Filaments may also be spun bright or to any degree of dullness. The bright at the present time predominates. However, more and more of the dull is finding a market in special yarns particularly in the woolen types of fabric.

With this brief introduction to the subject of spun rayon it is clear that the chemical and dyeing properties of spun rayon correspond and are essentially the same as for continuous filament rayon made in the same way, as long as the filament sizes are the same. It must not be assumed that equal weights of 1.5 denier, 3 denier or 5.5 denier filament staple will all dye the same shade in the same dye bath. As a matter of fact the finer filament staple will dye lighter.

In the early days of rayon it was assumed that all direct cotton dyestuffs should dye rayon perfectly, especially since the dyes had a much greater affinity for rayon than for cotton, and when shading or unevenness occurred the rayon was blamed. The dyeing of rayon became of considerable importance, therefore, to the rayon producers, and so quite an extensive and careful study of the behavior of dyes on rayon has been made. Much of the work has been done at he Courtaulds' laboratory in Droylsden near Manchester, England, and this dyeing of rayon I should like to discuss briefly in connection with the subject at hand as it leads to a better understanding of some of the dyeing difficulties encountered by the average dyer.

These earlier investigations soon showed that there was a great difference in the behavior of direct dyestuffs on rayon. Some went on rapidly, others did not. The former gave level results, the other did not, some requiring considerable quantities of salt to get them on to the fiber at all. It was then found that the temperature at which the dyeing took place was also an important factor, that is to say, the ratio of absorption varied widely with the temperature.

As early as 1920 Wilson & Imeson (J. Soc. Chem. Ind., Vol. 39T, p. 322) published a list of level, unlevel and intermediate direct dyes, which list was later extended by Mr. C. M. Whittaker. Much of this work was published in the (English) Journal of the Society of Chemical Industry, and in 1925 and later in 1931 small booklets were published by Courtaulds giving methods for the selection of direct cotton dyestuffs which dyed most evenly on viscose rayon. These methods were found so useful in England they were adopted as standards in color using circles.

In this country some dyers greatly profited by choosing their rayon dye combinations by the methods suggested. The earlier 1925 method was quite simple and consisted in determining the extent of capillary rise of the dye on viscose rayon. By making the test under standard conditions the capillary rise could easily be measured and compared. Thus it was found that a dye which rose to a considerable height dyed more level than one which did not rise so high, e.g., Chrysophenine G =19; Sky Blue FF = 9, and the suggestion was made to use dyes of approximately the same capillary number in compound shades to get the most level dyeing; but the capillary method was soon (about 1931) superseded by the temperature range test.

Eight small skeins of equal weight are reeled from the same skein of yarn and sufficient liquor for nine dye baths are made up in bulk to assure having enough dye liquor for the eight beakers. The dye bath is made up in a

*Presented before Southeastern Section, May 20, 1939.
**American Viscose Corp.

40:1 ratio and an amount of dye chosen to give a depth of shade equivalent to about ½% Sky Blue FF at 194° F. (90° C.); 2% soap and 10% Glauber salt are added as assistants. The dyestuff, soap and salt are all dissolved in half the required volume by thoroughly boiling the solution, then the other half of the water added and the solution distributed equally among the eight beakers. The individual beakers are then brought to the respective temperatures (70°, 90°, 110°, 210° F.), the test skeins added and the solutions kept at each specified temperature for ½ hour.

The dyes which have a maximum affinity at say 90° F. are better than those possessing this maximum at 122° F. which in turn are better than those with the maximum at 190°. It does not follow however that the dyestuffs with the strongest affinity at the lowest temperature, which are the most level dyeing, must therefore be used only at this temperature.

Experience has shown that it is best to dye viscose type yarns or rayon staples at as near the boiling temperature as circumstances permit, and it is not good practice to start dyeing at a low temperature and then gradually bring almost to a boil.

This temperature range test has proven of considerable value and is still useful to a certain extent. With the introduction of the fast-to-light colors this simple test no longer seemed to apply.

While these dyes show a maximum affinity for rayon fibers at about the boiling point (200° F.) and would thus be judged as unlevel dyeing dyes, this does not follow for they show a wide variation in level dyeing and their action is not predictable by the simple temperature range test.

If we consider the mechanics of dyeing as a process of diffusion—which is now quite generally accepted to be the case—then an equilibrium must eventually be established between the dye on the yarn and the dye remaining in the solution. Or expressed in another way, when equilibrium has been reached there will be as much dye going on to the rayon fiber from the solution as there is dye coming off the fiber and going back into solution.

The time required for dyes to reach this equilibrium varies widely and those dyes which reach it in a normal (i.e., practical) dyeing time are the level dyeing dyes, while those requiring an impracticably long time are the unlevel dyes. Yet all dyes will give level results if the dyeing time can be sufficiently prolonged, although in some cases this may require handling to the practical destruction of the yarn or fabric.

If the time required for a dye to reach equilibrium under some more or less standard conditions were determined it would be of great help to the dyer in choosing his colors, especially for compound shades.

In general, the speed of dyeing is increased with a rise in temperature, and with salt addition, within the range of normal dyeing. The rate also increases with the dye concentration and the dye is more completely exhausted from a concentrated than from a dilute solution. So there are a number of conditions influencing the rate of dyeing and the time required to reach equilibrium.

However, a few years ago Boulton & Reading (J. Soc. Dyers & Colourists, Dec., 1934, p. 381) published a paper on "Classification of Direct Dyes with Respect to the Production of Level Dyeings on Viscose Rayon," in which they give a method by which the dyeing speed of direct dyes can readily be determined. For details we shall have to refer to the original paper but the method is really quite smiple.

Very briefly the scheme is to determine (1) the amount of salt required to give a 50% dye bath exhaustion when the dyeing is allowed to proceed to this 50% equilibrium, determined by means of a colorimeter; (2) by means of a series of time dyeings with this amount of salt the time required to give a 25% exhaustion is found, termed the "time of half-dyeing." This "time of half-dyeing" varies widely for the different dyestuffs, represents the speed of dyeing and agrees perfectly with works' experience.

This test draws a much finer distinction between the direct cotton dyestuffs and supersedes the other two earlier tests mentioned, for it enables the dyer to make a much better choice of dyes for compound shades. It may be well to point out here that while a dye may give perfectly level results in a self-shade it does not follow that it will be equally good in compound shades.

	Time of Half Dye	
Chlorozol Fast Orange GS.....	0.07	
Diazo Brilliant Orange GR.....	0.22	very level
Chlorozol Fast Black BK.....	0.30	
Chlorozol Fast Orange AGS.....	155.5	
Diazo Brilliant Orange GR.....	0.22	poor levelness
Chlorozol Fast Black BK.....	0.30	

SALT SENSITIVITY

Some direct cotton dyestuffs are so sensitive to salt that even the amount of salt or sodium sulfate used in standardizing them is sufficient to give bad results. This is particularly the case in stock dyeing where the ratio of stock to dye liquor is necessarily small. Even the natural salt content of the water used may give trouble, e.g., Chlorantine Fast Blue GLL 200%. ½% dye. Material-liquor ratio 40:1. Dyed ½ hour at (90° C.) 195° F.

Type of Water	*% Exhaustion of Dye*
1. Distilled water	0.5
2. Permutit treated canal water 10° hardness.	1.7
3. Manchester tap water.....	3.8
4. Untreated canal water 10° hardness.....	46.7

Chlorantine Fast Blue GLL 200%. ¾% and varying amounts of common salt for ½ hour at 90° C. "Fibro"-rayon staple.

% NaCl	*% Exhaustion of Bath* 40:1	*Liquor-"Fibro" Ratio* 10:1
0	12.0	3.2
½	37.5	5.2
1	58.0	8.0

% NaCl	% Exhaustion of Bath	Liquor-"Fibro" Ratio
2	82.0	17.6
5	96.0	44.0

Note that only 1% common salt in the 10:1 ratio bath increases the exhausted 46%, whereas in the 40:1 ratio 1% salt increases it only some 4.8%.

This matter of salt sensitivity does not seem to be generally understood or appreciated by many average dyers if this can be judged by the way salt is ordinarily heaved into the dye bath. Dyeing instructions should not merely call for the addition of say 5-20% salt, but the amount of salt to be added should be definitely specified; and if 5 pounds are to be added, then five packages of one pound of salt should be provided, so that the salt may be added in equal and gradual amounts in specified intervals if level results are to be expected.

Having briefly discussed the importance of the selection of dyestuffs, particularly for compound shades; having referred to methods by which the proper selection of dyes can best be made; and having pointed out how very sensitive some direct dyes are to the presence of salts and salt addition, we would say a word about dye assistants, or "penetrants" as they are sometimes called. Quite a large number of specialty products have been put on the market for which great claims have been made about how they act as leveling agents. Some of these have been tested by us, others by our associates in England, but in most cases the claims could not be substantiated, and none of them have been found in any way superior to a simple soap bath except in those cases where such products act as correctives for water hardness, like the pyrophosphates or sulfated fatty alcohols.

STOCK DYEING OF RAYON STAPLE

In stock dyeing of rayon staple it must be remembered that the rayon fibers swell much more when wet than do either cotton or wool. Hence ample room must be allowed for this swelling and the stock should be thoroughly opened before loading into the machine. This is more important for the finer than for the coarser filament sizes. After loading it is well to allow the liquor to flow in slowly from the bottom so as to displace the air. Otherwise various sized air bubbles are entrapped throughout the mass with consequent channelling and masses of fibers remaining undyed.

One of the difficulties in stock as well as package dyeing is due to the small stock-dye liquor ratio. Although dye machines are rated as 1:8 or 1:10, this is true only as regards the total material to total dye liquor capacity, but what the dyer really wants to know is the effective ratio, namely that portion of the dye liquor in actual contact with a given weight of the stock at any one moment, and this has been estimated at possibly only a 1:3 ratio.

In the ordinary skein dyeing machines, for example the Smith-Drum or Buhlman machine, the liquor ratio is usually about 40:1, and the more rapid dyeing dyes level the quickest as there is always enough dye concentration in contact with nearly every portion of the material; but where the dye concentration is high and there is only a 1:5 or 1:3 ratio, the outside mass of fiber rapidly removes so much of the dye that the dye concentration is seriously reduced.

Hence for stock and package dyeing the rate of exhaustion is important as it determines the degree of penetration into the mass of the stock or package.

A dye which may be excellent for skein dyeing in a 40:1 ratio bath may go on the fibers so rapidly and exhaust the bath in so short a time as to be quite useless for stock dyeing.

A rapid test for determining suitability of dyes for stock dyeing is as follows:

A series of skeins of equal weight are successively dyed for one minute at a time in a 10:1 ratio dye bath at 90° C. until the dye has been exhausted. The greater the number of one minute skeins required, the less rapid is the dye exhaustion and the more suitable the dye is for stock dyeing.

Time of dyeing in minutes	% exhaustion Chlorozal Fast Orange GS	% exhaustion Chlorozal Fast Orange AGS
1	67.5	12
2	28	21
3	96	28
4	97	36

The GS is certainly not as suitable for stock or package dyeing.

Another important factor is dye penetration into the stock or package.

TEST FOR DETERMINING PENETRATION

Some 36s staple yarn is wound on several spools with fiber or preferably metal flanges top and bottom. Considerable care should be used so that all the yarn is wound on the several spools at the same uniform tension, and about that yardage of yarn wound on the spool as to comfortably fill it.

These spools are then set into the various dye solutions to be tested for 1 hour at 60° C., after which they are washed, dried, then knit into tubular stocking tubing. The length of colored knitting gives an idea of the relative penetration of the respective dyes into the package.

For stock and package dyeing therefore it is advisable to use slow dyeing dyes, i.e., those with a rather long time of half-dyeing. Thus, Solar Yellow 2R 180 which exhausts to 45% and has a time of half-dyeing of 85.5 minutes, gives good penetration, whereas Diazo Geranine B which exhausts 80% and has a time of half-dyeing of only .88 minutes has poor penetrative properties. However, the depth of shade plays an important part in stock and package dyeing and in general dark shades give better results than light shades.

Mention has already been made that in dyeing equal amounts of staple of different filament size, e.g., 1.5 and 3 denier, in the same dye bath, the heavier denier will dye

darker. Hence the finer the filament size of a staple the more dye will be required for a given shade. It is rather an interesting fact that this difference in depth of shade is really only an optical phenomenon, for it can readily be shown that despite the apparent difference in shade the dye bath exhaustion and therefore the amount of dye on the fibers is in each case the same, yet the larger sized filaments appear to have a darker shade.

Before going on it may be well to point out that the "time of half-dyeing" classification of direct dyes and the other tests suggested are really quite simple, requiring only the ordinary dye laboratory equipment with the possible addition of a simple colorimeter of the Duboscq type. Any intelligent high school boy or girl can be trained to carry out a whole series of tests in a routine manner, and a dyer using such a classified list of colors will certainly largely overcome and certainly minimize many dyeing difficulties.

A WORD NOW ABOUT VAT DYES

Just as in the case of direct cotton dyestuffs vat dyes have a greater affinity for rayon than for cotton fibers. It is also true that vats, like direct dyes, show a wide variation in absorption rate; and for compound shades it is again most important to use colors which dye at the same rate. This means also that dyes requiring strong alkali should not be used with those requiring weak alkali in combination shades.

Then there are also the solubilized vat dyestuffs which are being marketed under the name of Indigosols, and Soledon dyestuffs which do not require vatting but which can be applied to vegetable and animal fibers just like direct colors. They are sulphuric esters of leuco vat dyestuffs.

ACETATE STAPLE

Within the last few years acetate staple has made its appearance and its successful dyeing also depends upon the choice of dyestuffs. In a paper published in the American Dyestuff Reporter, May 17, 1937, methods for determining the relative dyeing rates, temperature ranges and half skein leveling tests are given which may be of interest.

DYEING OF FABRICS

Knit fabrics made of yarns 100% rayon staple must be handled with a minimum tension while wet, for unless this is done the handle of the finished goods is affected. The wet goods should not be allowed to lie around, but should be whizzed as soon as they come from the dye machine and dried at once.

In the handling of woven goods there is always the problem of warp size removal. Most of the rayon staple warps are sized with starch and therefore require a diastase or malt treatment to render it soluble and removable. Oil and sometimes waxes are used in the size and all such material must of course be removed in the sour before dyeing.

In drying "Fibro" fabrics minimum tension should be used and an allowable shrinkage of at least 4%. When the shrinkage is kept much below this figure (2%) the goods have an open appearance and papery handle.

Can drying gives good results if the temperatures are not too high. Tenter and Palmer drying are very suitable so long as the temperatures are not too high.

Owing to the fact that rayon and therefore rayon staple absorbs and holds considerably more water than cotton, there is always the tendency to run the driers at the same rate as for cotton and if the goods are not dry to raise the temperature. Rayon staple goods should be dried slowly and at a low temperature.

It is always important, in order to obtain a suitable hand in finishing that in addition to the usual softening finishes, the fibers be finished with the normal 10% moisture content. For certain types of cloth it is necessary to put on a stabilizing finish which prevents distortion of the fabric construction.

One of the interesting features about spun rayon is that it is so easily blended with other fibers like acetate, wool or cotton.

The dyeing of such blends presents certain dyeing problems centered around fastness to washing and cost. In general it is not possible to obtain the same degree of wash fastness on rayon wool blends that is possible on 100% wool fabrics, especially with dark shades, and the dyeing cost is higher. This difficulty may be overcome to a certain extent if the wool and rayon staple are separately dyed with sulfur colors for heavy shades, and vat or developed dyes for the pale and bright shades. The reason of course for this difficulty is that there are no counterparts in the direct cotton dye range which have the brightness and clarity of tone of the many acid wool dyes.

Some fibers are making their appearance which are nitrogenous proteins like wool and which take the full range of wool dyes as, for example, lanital, the fiber spun from casein and that made from the protein of soy-beans. Although fair quantities of such casein fibers have been produced in Europe during the past two or three years, the fiber is still quite weak and has not found the favor in this country nor even in Europe that was prophesied for it or expected of it.

Some special fibers have been made by introducing casein or rather the sodium caseinate into the viscose spinning solution with a view to "animilize" the fiber, but the amount of nitrogeneous material which can thus be introduced into a viscose spinning solution is limited and the effect is not nearly what might be expected. Another way to "animilize" the fiber is to treat the rayon staple, either the raw fiber, the skein yarn or the fabric with an amino-formaldehyde compound, and then heat to the rather high temperature of about 300° F. so as to combine the nitrogenous material with the cellulose so that the fibers can then be dyed by some of the acid dyes; but much of this is still in the initial or experimental stage.

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary or the American Dyestuff Reporter any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

IMPORTANT NOTICE
To Prospective Employers

Complete personal histories and employment records of the following applicants are now on file at the office of the American Dyestuff Reporter and with the secretary of the Association. These may be examined by prospective employers or copies will be loaned upon application.

A-1

Education—A.B., Chemistry, Cornell; 2 years organic chemistry abroad; knowledge of German.

Experience—Six years as chemist for large silk throwing concern; testing and application of dyes and textiles specialties in silk soaking; development work for yarn lubrication and moisture conditioning; familiar with knitting and finishing of hosiery. Laboratory work preferred.

Age 31; single.

A-B-7

Education—Evening school in textile dyeing and chemistry.

Experience—Dyehouse laboratory for 2 years. Foreman dyer and finisher on hosiery for 9 years. Experience on ribbons also vat dyes on rayon and silk skeins. 2 years assistant to superintendent. Desires position either in demonstrating and sales or dyer; New York Viciniy. Age 33; married.

A-B-8

Education—Graduate Chemist.

Experience—Print superintendent, colorist; eleven years' experience in all types of fabrics, specializing on rayon; 8 years' dyestuff laboratory and demonstrating. Excellent references; age 36; married.

A-B-C-4

Education—Educated abroad.

Experience—Twenty years experience in the textile field as bleacher, dyer, finisher and chemist. 16 years in charge of dyestuff laboratory of large dyeing plant, 4 years as chief chemist with large bleachery. Has tested dyestuffs, and chemicals used in the textile field and has manufactured soaps and textile specialties. Has handled all textile fibers; bleaching, printing, dyeing and finishing same. Has done pigment and lacquer printing, waterproofing and fireproofing. Reason for leaving last position was due to business conditions.

Age 41; married.

A-B-C-6

Education—English Municipal School of Technology; Board of Education, So. Kensington Chemistry Certificates; City & Guilds of London Institute in Bleaching and Dyeing.

Experience—In U. S. A. 22 years as chemist and chief chemist with one of the largest textile plants in the country; expert colorist; long experience with permanent and semi-permanent finishes. Specialist on vats, naphthols and indigosols. Age 50; married.

A-B-C-7

Education—B.S. in Textile Chemistry and Dyeing, 1939, North Carolina State College.

Experience—None. Seeks position as textile chemist and colorist. Age 21; single.

A-B-C-8

Education—B.T.C., 1933, Lowell Textile Institute.

Experience—5 months as rayon slasher tender; 8 months color matching, dye testing and analytical work; 5 years with large print works in rayon finishing department, laboratory, color matching, dye testing, assistant rayon dyer. Seeks position as rayon dyer, assistant dyer, or any job in a rayon dyeing and finishing plant. Age 29; single.

A-B-C-D-1

Education—Lowell Textile Institute, Bachelor of Textile Chemistry; Lowell Textile Institute (Evenings), 2 years D. C. Electricity; 2 years A. C. Electricity.

Experience—Six years as chemist and assistant dyer with a large organization. Specialized in dyeing, finishing, bleaching and drying of woolens, worsteds, cottons, rayons and unions in the piece. Some sales experience. Desires position as chemist, dyer, finisher, bleacher or sales. Age 30; American citizen; Married.

A-B-C-F-1

Education—Textile institute course; extension work at Brown; executive training with Alexander Hamilton Institute; knowledge of German.

Experience—Dyeing executive in all types of textiles, including stock, yarns, and piece-goods. Thorough knowledge of all classes of dyes and dyestuffs, and their successful practical application in the plant. Wide experience in all types and makes of equipment used in dyeing, bleaching, mercerizing and finishing. Laboratory practice in planning and checking methods and processes, costing and purchasing. Good manager personnel for efficiency and satisfactory results economically obtained. Cotton, rayon and silk, some acetate rayon, and mixed fabrics. Excellent references; in excellent health.

A-B-C-F-2

Education—Lowell Textile Institute, 1911.

Experience—26 years in cotton yarn and piece goods finishing plants; expert on naphthols, vats and other cotton and rayon dyeing; all types of control work and testing; analytical processes; purchasing of dyes and chemicals. Age 46; excellent references; in perfect health; will go anywhere; married.

B-4

Experience—Foreman dyer in charge of ribbon dyeing for 20 years. Experienced on silk, cotton, rayon, acetate yarn. Age 41; will go anywhere.

B-5

Education—High School and Textile School Graduate.

Experience—Twelve years overseer of dyeing on directs, vats, naphthols, sulfur, basic and developed colors. Also experienced bleacher. Age 40; married; references.

B-6

Education—Textile School Graduate.

Experience—Former instructor in chemistry and dyeing. Twelve years' experience as overseer of dyeing of vats, naphthols, developed, indigosols, sulfur and direct colors on piece goods. Age 35; excellent references.

B-7

Education—Municipal School of Technology, England. Chemistry certificates of Board of Education, So. Kensington. Bleaching, Dyeing and Printing Certificates of City Guild of London Institute.

Experience—In U. S. A. 16 years as assistant and colorist in large plants, all styles of fabrics.

Age 46; married.

B-C-3

Education—Graduate, Philadelphia Textile School; speaks German fluently.

Experience—Employed at velvet company for 7½ years. Past 2 years working in finishing department on regular, waterproof and crush-resistant finishes (resin finishes). Can take charge of finishing of velvets. Have some piece dyeing experience.

29 years of age; married; will go anywhere.

F-1

Education—Two years high school; 6 years evening engineering school; 1 year evening textile school; 1 year industrial management; course in accounting.

Experience—Ten years in an executive capacity in full fashioned hosiery manufacturing business. Familiar with entire manufacturing procedure, finishing dept., dyehouse and office. Specialized in finishing dept. and has good eye for color, finish and quality. Had responsibility of all orders going through mill, stock, grey goods and traffic. Five months in New York sales office. Gets along well with people and contact with employees and customers has always been satisfactory. Previous to hosiery experience was in a mechanical business for 17 years.

43 years of age; single, in good health; will go anywhere.

THE CONVENTION CITY

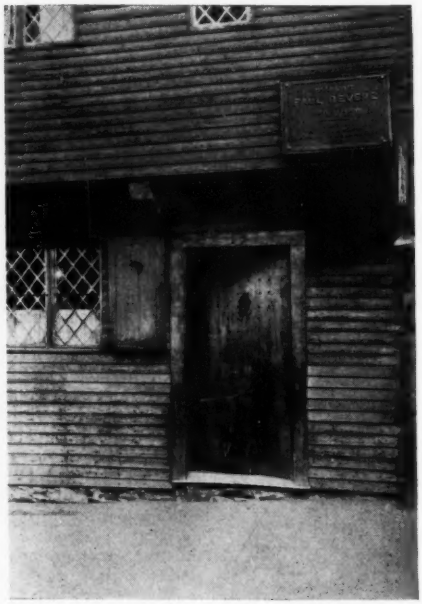
Annual Meeting and Convention, Boston, Massachusetts, Sept. 15 and 16

BOSTON—a world-famous metropolitan city extends to you a welcome which has gathered warmth for 300 years.

If you wish to visit historic landmarks, reminiscent of our country's birth and early struggles, you are welcome. If you are looking forward to enjoying the varied out-of-door attractions of this section you are equally welcome. Or if you are interested in the manufacturing, merchandising and civic life of today, you are welcome.

Boston is proud of her past. In the Boston Metropolitan Area are more places of outstanding interest related to early American history than anywhere else in North America. They are the heritage of every one. Where is the American who has not stirred with patriotic pride to the memories of Plymouth, Faneuil Hall, the Boston Tea Party, Paul Revere and the Old North Church, Lexington, Concord and Bunker Hill—and has not the desire to visit them?

Within easy distance of Boston are many delightful beaches, the Green and White Mountain ranges with their magnificent scenery and grand views, lakes of surpassing beauty, woodlands and rivers each attractive in itself but especially appealing to hunters and fishermen, pleasure trips by steamer around Massachusetts Bay or up and down the coast of New England, the joys of out-of-door sports and the thrills of New England winters. Whoever enjoys nature will find satisfaction; and excellent transportation and hard-surfaced highways bring all the out-of-doors within easy reach of the city proper.



PAUL REVERE HOUSE, located at 19 North Square, is the oldest house in the city of Boston, being built about 1660. It was purchased by Paul Revere in 1770 and he resided in it until 1800. The immense fireplaces, the ancient wallpaper and many other features of the Colonial period make it a most interesting house to visit. It was restored in 1908 and is open on week-days and holidays from 10 A. M. to 4 P. M. Admission is 25c.

But so much historic atmosphere gathers around Boston that sometimes we neglect to appreciate that the BOSTON OF TODAY is a metropolitan area—not merely a city—of nearly 2,500,000 population, with factories, assembling plants, workshops, mills, warehouses, the resources of a magnificent port of entry, all contributing to make her one of the foremost manufacturing, industrial and commercial centers of the world. The sparse settlements of the colonists have become a great center of business activity. High courage, friendliness and desire to build well the Boston of today inspire constant progress so that the city will maintain the leadership position now enjoyed.

So whether you come by land, sea, or air, Boston's beacon lights are burning, and the city is ready to greet you. Boston is the busy center of New England business; nevertheless the visitor is not a stranger, but a guest—and the best is his.

Photos, Courtesy Convention Bureau, Boston Chamber of Commerce.

MUSEUM OF FINE ARTS, located at 465 Huntington Ave., was built and is maintained entirely by voluntary gifts and subscriptions. It is world famous for its collection of Chinese paintings, Japanese prints, Indian art in all its branches, Royal Egyptian sculpture of the Old Kingdom, original Greek marbles and vases, collection of prints illustrating the history of prints in Europe from the fifteenth century to the present, paintings by masters, period rooms and a collection of early American silver. Admission is free.

BUSINESS SKYLINE OF BOSTON, showing the Public Garden and Boston Common in the foreground.

Modern Printing —

(Continued from page 381)

approach those of silk. Today, the solution of this problem of brightness has been brought nearer by the use of the new class of water-soluble Astrazon dyes. They are best dissolved in hot water containing Glyceine A. Then the water solution is stirred into gum thickening, e.g. gum Senegal or crystal gum, and, a short time before printing a mordant for cellulose acetate rayon is added. After printing, the goods are steamed without pressure in a cottage steamer, from 30-45 minutes. The steamed prints are directly treated in rope-form in a solution of 3-5 g. Katanol WL per l. This style is suitable for lustrous and delustered cellulose acetate rayon, as well as for mixtures of this fiber and viscose rayon, especially if the former constitutes the larger part of the surface, e.g. satins. The prints have exceptionally high brightness, combined with good fastness to light, water, washing and sea-water, so the potentialities of printing cellulose acetate rayon have been greatly increased by these new dyes.

In the dyeing process for discharge grounds in pale shades only, a new development has taken place. In many countries, and for a good number of articles, printers have passed from direct dyeings to grounds padded with Indigosols. The reasons for the change are especially to be found in the cost of the whole procedure, as the higher fastness to washing is not the cause, but is only an additional approved fact. This statement seems to be somewhat absurd when the price of any direct dye is compared with that of a leuco-ester of a vat dye. The difference is evident, however, on comparing the dyeing methods. Direct dyeing of cotton on the jigger and of viscose and spun rayons in rope form, continues for at least 4 hours, whereas Indigosols are applied by slop-padding in as many seconds. In a comparison of vat dye discharges on pale direct dyeings with vat dye resist-printed material, which, after steaming, is padded with Indigosols, the sequence of the operations shows that the direct dyeing needs one drying process more, whilst the use of Indigosols saves drying altogether. This view seems to be correct, for padding is combined in one run with the development of the vat dye resists, which, in any case, is a necessary process for vat discharges on direct dyeings. Therefore, it is only a matter of the cost of a lengthy dyeing process plus a drying operation against the price of the Indigosol dye. The calculation has been definitely decided in favor of the Indigosol.

Vat dye resists under padded grounds of the leuco-esters of vat dyes are therefore in general use for cotton dress goods, flannelette, spun viscose rayon and crepe goods. Many of these articles do not require to be dyed fast to washing, so that the cheaper products of the Indigosol range are used. A remarkable contrast has been noticed between the appearance of the white resist and the white discharge, viz. the white resist is much better than any discharge on the best dischargeable direct dyeing.

The same resist process has become of importance in printing shirting cloths. This refers to patterns that were originally printed with vat dyes, especially patterns of small dark parts on pale grounds, e.g. stripes, with only a relatively small part of the white ground left unprinted. The process is also now used for shirtings by printing the cheap white resist alongside dark vat dyeings. After steaming, the Indigosol padding operation follows as usual. The new process works more quickly in printing and is cheaper as regards engraving costs. On the whole, it is essential today that print-works should be equipped with suitable plant for quick padding and developing.

If the lines along which these changes are developing are summarized, it will be seen that new dyes have enabled the printer to produce brighter and/or faster effects, as in the case of the naphthol derivatives. A pattern printed with the brightness and the deepness of naphthol dyes is easy to distinguish from a print with other fast dyes, and these properties have influenced fashion in their favor. Of greater importance for the print-works is the great variety of methods by which the dyes of several groups can be applied in printing or dyeing, since this variety makes it possible to combine a good printed effect with a profitable production method.

Processing of Rayon —

(Continued from page 384)

STANDARD PROCEDURE NO. 2

Jig (Constant speed automatic)—80 gallons volume
Bleach white—chlorine method.
Run goods off shell onto jigger thru cold water—*Watch Tension*
2 Ends cold running water (including running on)—drop liquor
10 Ends in the following boil-off—
1 lb. tetra sodium pyro phosphate
1 lb. sulfonated fatty alcoholate
Raise bath to 200° F.—then start up—temperature 200° F.—drop
2 Ends hot water wash—temperature 160° F.—drop liquor
2 Ends running cold water
6 Ends in bleach bath—prepared as follows:
2 quarts liquid bleach (15% available Cl-54° Tw.) See dye sheet as to amount
(1 gram available chlorine per liter)
3 pints acetic acid 56% (see dyer as to pH)
(.75 to 1.0 cc. 56% acetic acid per liter)
Temperature cold (room temperature)
2 Ends cold running water
2 Ends acid wash (anti-chlor)
1 pint muriatic acid
Temperature 120° F. (raise bath to 120° F. and start)—drop liquor

4 Ends cold running water—test goods for chlorine—see dyer
White tinting (dyeing)
6 Ends in following tinting bath—
0.5 lb. fatty alcohol
0.1 lb. tetra sodium pyro phosphate
1.0 gram acetate Violet BB Conc.
Temperature 160° F. (raise to temperature—start)
On last end run onto shell without cooling.

STANDARD PROCEDURE NO. 3

Jigg—automatic or standard non-automatic
Volume—80 gallons, weight—180-220 lbs.

Thread goods over (outside) one or both expander rolls and run thru the cold water and preparation. Re-thread under expander rolls on addition of boil-off and run for subsequent operation. (See Dye Sheet)

Direct Dyeing Acetate Colors—Taffetas and Satins—
Preparation—
1 End—run onto jig dry—Method No. 1
2 end—run thru cold water—taffetas—drop
run thru warm water—satins—drop
2 End run thru water at 90° F.—add enzyme
2-4 End—run at 120-140° F.—drop
1 End—hot rinse—190° F.—drop
Boil off—Enter materials
1 lb. tetra sodium pyro phosphate
2 lb. olive soap
2-4 Ends at 190-200° F.—drop ½ bath
Bring bath to 80 gallon volume at 140° F.
Add 1 lb. olive soap (previously dissolved)
Enter prepared and strained dyestuff—½ on each end—heavy shades
Enter prepared and strained dyestuff—¼ on each end—light shades
Run dye bath at 200° F.
4 Ends—sample—*shut off steam for color addition.*
Add color addition—2 Ends—sample every 4 Ends until shade is obtained— drop
2 Ends cold wash till clear—check for crocking
2 Ends cold wash—140-180° F.—0.5 lb. sulfonated fatty alcoholate
2 Ends warm wash 100-120° F.
1 End cold—½ pint formic acid and onto shell.

STANDARD PROCEDURE NO. 4

Jig (constant speed automatic) Yardage—approx. 1,000 yards
Volume—80 gallons—Weight—approx. 200-220 lbs.
Direct Dyeing Acetate Colors
1 End—run on to jig wet thru cold running water—*Watch Tension*
1 End—thru cold water.
1 End—at 100° F.
Boil Off—enter materials 1.0 lbs. tetra sodium pyro phosphate
as listed—2.0 lbs. low titer soap
0.5 lbs. sulfonated fatty alcoholate paste
1 End at 120° F. in B. O.
4-6 Ends at 200° F.—*check with dyer* as 2 to 4 ends should be O. K.
Drop liquor—no wash.
Standard Dye Bath—Enter materials as listed—(See instruction sheet for number of ends to run for sample)
0.2 lbs. tetra sodium pyro phosphate
0.5 lbs. sulfonated fatty alcoholate paste
0.5 lbs. penetrant—concentrated—Omit on shades where pre-bleached.
Dyestuff—
Add tetra sodium pyro phosphate in cold bath (previously dissolved)
Add 0.5 lb. sulfonated fatty alcoholate paste at 120-140° F.
Raise bath to 200° F. Use additional 0.5 lbs. sulfonated fatty alcoholate paste in pasting and dispersing the dyestuffs to be added as follows:
Add ¼ the *strained dye solution* before each of the first 4 ends.
Shut off steam when adding dye.
Temperature of dyebath—200° F. (See instruction sheet for special temperatures)
Ends to sample for shade—
If instruction sheet gives 4 ends for addition of dye—add in 2 Ends
If instruction sheet gives 6 ends for addition of dye—add in 4 Ends
When shade is approved by dyer—then give:
2 Ends hot wash—water at 120° F. (wash until clear in bath.)
1 End at 140° F. in bath with 1 pint acetic acid 56%
If only standard finish required on goods, then run on to shell
On special finish, run as directed on standard finish and acetic acid then run 2 ends at 160° F. with special finish and on to shell.

STANDARD PROCEDURE NO. 5

Jig—Automatic or standard non-automatic
Volume—80 gallons; Weight—150-175 lbs.

Thread goods over (outside) one or both expander rolls and run thru cold water and preparation. Re-thread under expander rolls for addition of boil-off and run for subsequent operation. (See Dye Sheet)

Developed Acetate—Navy and Black
Use for Taffetas and Satins—(See dye sheet for heavy goods)
Preparation—
1 End run on jig—dry—Method No. 1—*Watch Tension*
2 End run thru cold water (taffetas and linings)—drop
run thru warm water (satins)—drop
2 End run at 90-100° F.—add enzyme
2-4 End run at 120-140° F.—drop
1 End hot rinse—190° F.—drop
Boil-off—Enter materials—
1 lb. tetra sodium pyro phosphate
4 lb. olive soap
2 Ends 200° F.—drop ¼, refill and raise to 180° F.
Dye Bath—180-190° F. light goods—200° F. heavy goods

Enter prepared and strained dyestuff—½ each end—*shut off steam*

10 Ends—sample and have lab D & D for shade

14 Ends standard—(see dyesheet for special instructions as to ends for heavy goods)—drop

2 Ends at 200° F.—Add 0.25 lb. sulfonated fatty alcoholate—drop

2 Ends cold—rinse—running water—drop

Diazo Bath—cold—volume 80 gallons

Navy	Black
3.25 lb. nitrite of soda	4.0 lbs.
4 quarts muriatic acid	5.0 quarts

Developed Acetate

1st End—cold—enter ½ nitrite—dissolved
enter ½ muriatic acid—diluted

2nd End—cold—enter ½ nitrite of soda
enter ½ muriatic acid

2 Ends—cold—with all chemicals—drop

Test for condition of bath—pH and potassium iodide paper

2 Ends—cold running water—

(Have dyer check water and goods to determine if free of acid conditions)

Development Bath—40 gallon volume

Navy	Black
1.90 lb. BON	2.25 lb.
.45 lb. caustic flakes	.56 lb.
.25 lb. sulfonated fatty alcoholate	.25 lb.
0.5 to 0.75 pint formic acid	.50 to .75 pint

Navy	Black
1 End at 100° F.	100° F.
1 End at 120° F.	120° F.
2 End at 130° F.	140° F.

Drop

2 Ends—160-180° F.—.50 lb. sulfonated fatty alcoholates

2 Ends—120° F.—½ pint formic acid or 1 pint 28% acetic—

Last end run onto shell.

STANDARD PROCEDURE ON JIGG NO. 6

Developed Colors—Acetates—750-1,000 Yards—160-200 lbs.

Volume—80 gallons.

1 End—run goods on to jig *Dry. Watch Tension*

1 End—run thru cold water—drop.

1 End—run thru water at 100° F.—drop

Boil-Off—Enter materials 1.0 lbs. tetra sodium pryo phosphate

As listed—1.0 lbs. sulfonated fatty alcoholate paste.

1 End at 120° F. in B. O.

24 Ends at 200° F.—check with dyer as 2 ends may be sufficient

Drop liquor—no wash

Standard Dye-bath—Run at 200° *F.* (See dyer for required number of ends to run)

Regular type Blacks and Navy

Dye Bath:

0.1 lb. tetra sodium pyro phosphate

1.0 lb. fatty alcoholate paste

x dyestuffs

Sample on 10th end in dyebath—have sample D. & D in Lab.

Repeat sample on 12th and 14th ends.—If shade correct, dyer will O. K. shade.

Drop bath

2 Ends—hot wash at 200° F. with 0.25 lb. sulfonated fatty alcoholate—

Drop liquor—sample—check for crocking

2 Ends—cold running wash—drop liquor

Standard Diazo Bath—Run 3 Ends Cold—(all chemicals in bath on the 1st End)

3.5 lbs. nitrite of soda (enter 1st)

5.0 qts. muriatic acid (enter 2nd)

DYER—Test bath for nitrous gas content at start and every end.

Bath must be in good condition before dropping—IMPORTANT

If bath not in correct condition, make chemical correction and run additional Ends.

If bath O. K., give 2 ends cold running bath, then developing bath

Standard Developing Bath—Prepare as listed—60 gallon volume

Black	Navy
2.30 lbs. BON	2.00 lbs.
0.58 lbs. caustic soda flakes	0.55 lbs.

1.00 pt. 28% acetic acid or ½ pint 56% acetic acid

Preparation of BON with NaOH (caustic soda) or NH_4OH (ammonia)—see dye sheet

Paste BON with cold water—add caustic—then add steam slowly till solution is reached—strain and add to jig. Add the acetic acid (diluted) slowly and stir—bath has milky appearance. If bath has too milky an appearance, add extra acetic acid. Ammonia may replace the caustic soda as it gives a clearer bath when acetic acid is added.

Always have bath on acid side—*test with litmus—important*

Developing Bath Procedure—

1 End cold BON bath

1 End at 110° F.

2 Ends at 140° F. for Blacks—130° F. for Navy

If shades not correct on 2nd end at 140° F. or 130° F. then run extra 2 Ends and check shades

If shade is O. K., drop liquor

Finish—

2 Ends hot wash—0.5 lb. fatty alcoholate paste at 180° F.—drop liquor

2 Ends hot wash—water at 120° F.—drop liquor—SAMPLE for crocking.

1 End in bath at 140° F. with 1 pint acetic acid 56%

(Run on to shell unless there is a special finish to apply—See instruction sheet and dyer regarding finish on developed colors)

Special Finish—Usually applied at 160° F. in 2 Ends—on to shell.

(To be continued)

Some New

Chemical Dyeing Processes

J. WAKELIN

MUCH investigation has been done and much ink spilled in controversy upon the question of whether the dyeing of textile fibers is a chemical, physical or an electrical phenomenon, or a combination of them all, but this account is not concerned with that topic. Some dyeing processes are more definitely chemical than others, as for example the application of azoic and vat dyes. Whereas in the treatment of cellulosic fiber with a substantive dyestuff the process consists merely in bringing the two together under favorable conditions, the coloration of cotton or rayon with vat dyes involves a distinct and separate chemical reaction apart from the fibers themselves.

It may be instructive to consider a few recent discoveries and new processes of the same type, that is, involving some chemical change in the coloring principle at the time of its attachment to the fiber. All of the following inventions aim at facilitating the act of dyeing or improving the results obtained, and in many cases although the sequence of chemical changes is somewhat involved, the performance of the actual dyeing as done in the dye bath is of great simplicity calling for the treatment of the material with an acid vapor in one particular instance.

Indigo might be cited as a familiar example of a dye which is applied by a chemical reaction. As every reader knows, this insoluble body is first reduced to a soluble leuco derivative and is applied to the fiber in that form, later to be oxidized back in contact with the fiber to the colored insoluble compound. Without going into detail, it is well known that dyes of this class exhibit a very high degree of fastness to washing and most other agencies.

An interesting new auxiliary for use in vat dyeing is the subject of a patent to Imperial Chemical Industries and consists of a quaternary restraining agent which slowly decomposes in the bath. In the early stages the dyeing process is retarded, making for better penetration and levelness, but after a time the auxiliary which is an ester and hydrolyzes, loses its power and the color then creeps onto the material faster and waste is thus diminished and a good building up of shade is produced.

The compound in question is derived from dimethylamino-para-benzoic acid. The cetyl alcohol ester is prepared by reacting the benzoyl chloride of the above with cetyl alcohol. Finally, the product is treated with dimethyl sulfate to give the corresponding quaternary salt.

$$C_{16}H_{33}\text{-O-CO}—C_6H_4—N\ (CH_3)_3—SO_4\text{-}CH_3$$

The compound dissolves readily in warm water to give clear forming solutions, whilst in the solid state it is a white crystalline solid melting at 104 to 107° C.

A vat is made up from 3.3 parts by weight of Caledon Jade Green, 0.53 parts sodium hydrosulfite concentrated powder, 5.3 parts of caustic soda and 1,000 parts water, and to it is added 0.1 part of the above and 33 parts of cotton yarn are introduced. After impregnation for 45 minutes at 45° C., the yarn is removed, oxidized and soaped at the boil for 20 minutes in 0.2 per cent soap solution. The resulting dyeing shows excellent penetration, levelness and good building up of color. The chemical reaction upon which this method depends is the decomposition of an ester.

The hydrolysis of an ester to promote dyeing is involved in a process patented by the Society of Chemical Industry, although the method is entirely different from the last. They report that insoluble azo dyestuffs containing at least one hydroxy group may be made more soluble by esterification with reagents such as substituted benzoyl chloride, sulfobenzoyl chloride, benzoic acid disulfochloride and so forth. Such ester compounds of dyes are dissolved in a cellulose acetate spinning solution and the spun filaments are then treated with ammonia which hydrolyzes the ester group and regenerates the insoluble dyestuff within the fiber.

For example, the azo dye from diazotized 2:5 dichloraniline and 2:3 oxynapthoic acid-ortho-anisidide is reacted with meta benzoic acid sulfonic chloride and the dye derivative is added to a solution of cellulose acetate in acetone and alcohol. This is then worked up into films or threads, these being then treated with a dilute solution of ammonia to regenerate the original dyestuff.

Or again, the azo dye from diazotized 4:4′-diamino-3:3′-dimethoxy-diphenyl coupled to 2-oxynapthalene is esterified with benzoic acid meta disulfochloride and the product added to a viscose spinning solution. The original dyestuff is regenerated in the spinning mass. (For details of the preparation of these esters see British Patent 480,358).

Dyeing by the ice-color or diazotization method is an apt example of chemical dyeing method within the scope of our definition, but the usual methods of carrying out this class of dyeing have already appeared in the literature and must be familiar to readers and so it is not proposed to cover this ground again here. It may however, be worthwhile to mention a recent patent to E. Clayton

which proposes a rather novel modification of the usual coupling procedure in conjunction with the spinning of cellulose ester rayon. Filaments are to be made containing both necessary components for an azo dye but being essentially uncolored as manufactured. However, when desired, these fibers may be dyed by the simple expedient of treating them with an acid vapor or of an acidic nitrite bath. That would indeed be reducing dyeing down to the simplest conceivable operation—although the "dyer" of such prepared material could hardly feel satisfied with his lack of choice in the colors obtained.

Two solutions are made up separately and mixed when ready. The first contains 2-hydroxy-3-napthoyl-aniline dissolved in aniline in the presence of caustic soda and a proportion of phthalate or triacetin as plasticizer. The second contains ortho-aminoazotoluene dissolved in acetone. A dope is made from a mixture of the two and cellulose acetate and it is spun. The dry filaments are developed by passing through a dilute solution of sodium nitrite and acetic acid. If amyl nitrite is incorporated in the dope, this takes the place of the alkali nitrite and such fibers may be colored simply by exposure to an acid atmosphere. (See British Patent 483,148).

The vat and azoic methods of dyeing both yield highly satisfactory results in competent hands but suffer from being a little costly and intricate in operation. It is not unnatural therefor that research chemists have sought to find means of simplifying their mode of application and minimizing the number and complexity of separate operations involved.

Work in recent years has been relatively successful in the realm of azoic dyes, for stable derivatives, which keep indefinitely in storage yet are readily amenable to treatment when required, can now be purchased at many supply houses.

One class which is of outstanding interest is the diazoimino type. Here the amine is diazotized and temporarily "coupled" to a second amine which has solubilizing powers. Thus, the Du Pont Company have disclosed the idea of using methyl-glucamine as temporary component. This, a derivative of glucose and carrying solubilizing groups is linked up to an amine substituted with negative groups to give a complex which if not soluble, is at least dispersible. We may represent the combination as below:

$$Ar - N = N - N(R)-R_1$$

R_1 confers dispersibility upon the complex. On treating it with acid the diazoimino linkage breaks and an active diazonium salt ready for coupling is regenerated and at this stage the mixture may be brought into contact with the napthol.

It is now possible to prepare a composition containing all the components and ingredients necessary to make an insoluble dye—only the textile fiber is required otherwise. The cotton material is printed with the prepared paste from an engraved copper roller. It is next dried in air and then live-steamed at 218° C. for 5 minutes, that is passage through a vat color ager. The material is colored in fast shades without further or more elaborate treatment.

The explanation of this apparently magically simple process is as follows. The print paste contains the diazoimino compound from diazotized 4-chloro-2-toluidine united to methyl-glucamine. The latter of course is lost in the process as soon as steaming takes place. There is also present a suitable proportion of the ortho-toluidide of 2:3 oxynapthoic acid which is what the chloraniline ultimately couples to finally. Caustic soda and glycol monoethyl ether is also present in the composition as well as gum tragacanth thickening. An addition of sodium mono-chloracetate is also made. This ingredient breaks down on steaming and liberates acid and it is this acid which splits up the diazoimino compound and starts the ball rolling. As an alternative to this procedure, an ammonium derivative of the diazoimino compound may be employed and this is decomposed by steam alone without chloracetate or other acidic agent.

Dyes

as an Aid in Reclaiming Pipe

F. R. Cozzens

IN the abandoned oil-fields of Ohio, West Virginia, and Kentucky, where thousands upon thousands of feet of pipe are being reclaimed, dye products have become a very important part of the picture. This pipe, which varies from one to sixteen inches in diameter, has been subjected over a course of years to practically every type of under-ground corrosive agent, including acids, mineral oxides, sulfur, salt water, and compressed air; and before it can be again placed on the market for industrial use each section must undergo a rigid examination for flaws. The first act is to scrape the outside surface of the 20 foot sections as free as possible of sludge and residue. Sections of the same diameter are next placed flat on the ground and joined together into 2,000 foot lengths. One end of the "worm" is closed by a valve, and into the opposite end is poured a mixture of twenty gallons of ordinary soap suds heated to boiling point, into which is stirred one pound of red dye. The pipe is then connected with a portable air compressor and a pressure of 100 pounds per square inch is applied and maintained for a period of from six to ten hours.

An attendant, keeping close watch on the pipe under pressure will invariably overlook a flaw that is not sufficiently large to cause an audible escape of air, but the dye which accumulates atop the oily residue will be readily pushed out through any open seam or sand-hole capable of disqualifying the section. Such sections are marked for necessary repairs.

When the pipe under treatment has been subject to underground acids, a different procedure is followed. Instead of soap suds and red dye, a ten gallon soda solution into which has been stirred one pound of litmus dye is introduced under air-pressure into the pipe. Minute holes and pits resulting from acid corrosion will readily reveal their presence by the appearance on the outside surface of the brick-colored residue, resulting from the purple-dyed soda solution. In the case of pipe damage by various mineral oxides, the color changing scheme is especially valuable. By the introduction of certain colored dyes in a soda solution it is often possible to tell the exact oxide which has caused the damage. The purple litmus soda solution readily becomes orange colored in the presence of sulfur. Bright colors, especially light yellow or pink, turn a dirty brown in the presence of iron oxides. Salt-water residue turns saffron or yellow when brought in contact with blue-dyed soda solution. These, and similar chemical changes which dyes reveal are money-savers for the oil operator, because treatment of reclaimed pipe depends largely upon the agent which caused the damage. Then, too, dye pigments forced into seams and pits of pipe under pressure, form an excellent foundation for paint which follows later, and in themselves are preventatives against rust.

In the reclamation of pipe, as in various oil-field practices, dyes play a role that could be taken by no other known material. Operators realize this fact, and dyes, pigments, formulas and charts are now made a part of the equipment on the modern oil lease.

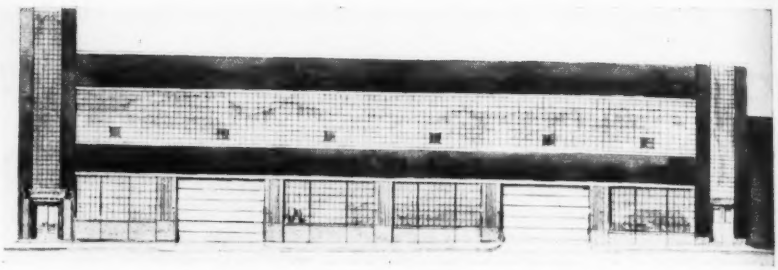
TRADE NOTES • NEW PRODUCTS

• SCHOLLER BROS. ENLARGE PLANT

A modern, two story brick and glass building now under construction adds 20,000 square feet to the plant of Scholler Bros., Inc., manufacturers of textile soaps, softeners, sulfonated oils and finishes.

Built on Collins Street north of Westmoreland in Philadelphia, the upper floor will house modern, air conditioned laboratories equipped with the latest in fabric testing apparatus. The lower floor will be devoted to storage and stock rooms.

The building is expected to be ready for occupancy about October 1st.



Architect's Drawing of New Scholler Building

• NEW L.T.I. TRUSTEES NAMED

On July 12th, Governor Saltonstall of Massachusetts submitted to the Executive Council for approval the following names as trustees of the Lowell Textile Institute:

Roland E. Derby, replacing John E. Regan. Mr. Derby is a graduate of Lowell Textile Institute and is chief chemist of M. T. Stevens & Sons Co., North Andover, Mass.

Stephen Gleason, replacing Walter F. Connor. Mr. Gleason is a graduate of Bradford Durfee Textile School and the R. I. School of Design and is now with the Walter L. Parker Bobbin & Spool Co.

Ulysses J. Lupien, replacing Charles C. Schloss. Mr. Lupien is a graduate of Harvard and is now a mill manager.

Richard G. Chadwick, replacing James H. Riley. Mr. Chadwick has attended Lowell Textile Institute, M.I.T., Boston University and Harvard and is now an engineer with the New England Telephone & Telegraph Co.

Harold V. Farnsworth, replacing John C. Carr. Mr. Farnsworth is a graduate of Lowell Textile Institute and has been associated with the Amoskeag Mills, Stark Mills, Lockwood, Greene Corp. and Atkinson Haserick Co.

• GENERAL RELEASES

General Dyestuff Corp., 435 Hudson St., New York City, has released a circular describing the following product:

Fastusol Blue L F F B L—which produces a desirable bright blue shade of a somewhat redder cast as compared with the well-known Fastusol Blue L F F G L. It is stated that the very good light fastness of this color is in line with the other familiar blue brands of this range. Circular No. 1652.

• UNIFORM TEXTILE COLOR TOLERANCES

In concluding his paper on "Specification of Uniform Color Tolerances for Textiles" in the June issue of *Textile Research,* monthly publication of U. S. Institute for Textile Research, Dr. Deane B. Judd, physicist, National Bureau of Standards, states that "there is every promise that a continuation of the study will result in a practical solution of the problem by means of a formula no more complicated than formula 5 studied here." He suggests possible modification of this formula, and also other systems that might be tried.

• NEW BEDFORD GRADUATION

Graduation exercises of the New Bedford Textile School took place on June 9th in the school hall. John A. Shea, president of the board of trustees, delivered the opening address. The medal of the National Association of Cotton Manufacturers, won by W. Gordon Ogden, was presented by William A. Karl, a director of the Firestone Cotton Mill, a former graduate and winner of the same medal. The main address was delivered by Patrick J. Moynihan, chairman of the State Commission on Administration and Finance. George Walker, principal of the school, delivered the final address of the exercises.

Diplomas in the dyeing, chemistry and finishing course were awarded to the following: Joseph G. Aillery, William D. Armitage, James W. Beattie, David S. Braiden, Herbert A. Briggs, Robert E. Connor, Samuel Craven, Jr., Paul J. Dalbec, Joseph Dias, George H. Duckworth, Clifford P. Flanagan, Frederick E. Geory, John V. Harrington, John E. Houghton, Elton L. Mann, Donald F. Phinney, Donald T. Smith, Henry Taylor, Rickard C. Temple, Alfred J. Zawisza.

• REDWOOD TANKS

An addition to the series of technical bulletins by their Consulting Engineer, B. F. Wade, has just been released by the California Redwood Association — "Redwood Tanks for the Textile and Allied Plant."

The use of wood tanks in textile plants and related operations is said to cover a wide range of applications and Redwood tanks have a specific field in these various industries.

The bulletin discusses the properties of Redwood and the effects of organic and inorganic acid solutions and alkali solutions. It also outlines specific applications.

Special instructions are included for cleaning and painting new tanks. Copies may be secured by writing the California Redwood Association, 405 Montgomery Street, San Francisco, Calif.

● GRADUATES PLACED

Dr. Thomas Nelson, Dean of the Textile School at North Carolina State College, announced on June 22 that 95 per cent of the 60 young men who received textile degrees at the commencement exercises on June 5th had been placed in positions. Dr. Nelson said that the other five per cent were in communication with prospective employers and he expected the entire class of 1939 to be placed before July first.

Two of this year's graduates have already sailed for their homes in China and another member of the graduating class has returned to his home in Mexico. Each will be connected with textile organizations in their native country that are supervised by their fathers or relatives.

Of the 57 American boys in the class of 1939, at least 44, or 77 per cent will be located in North Carolina. Six will be located in South Carolina, two in New Jersey, and one each in New York and Tennessee.

● LEIPZIG FAIR DATES

The historic Leipzig Fair will hold its 1982nd session this year from August 27th to 31st. Some 6,000 firms from twenty-five countries will display their standard wares and newest items. It is assured that over 150,000 business men from 74 countries will attend. The Fair offers a valuable preview of every conceivable art and industrial product carried by department and specialized stores. It will include the great Building Show with its comprehensive display of building materials and equipment with demonstrations of the newest building methods.

● GEORGE A. MESSENGER RECOVERS

George A. Messenger, vice-president and partner in Watson Park Company, 261 Franklin St., Boston, Mass., has returned to his office after an absence of 12 months due to illness. Mr. Messenger returned from the South the latter part of April, having fully recovered in health.

After devoting a few weeks to cleaning up details, Mr. Messenger plans by early fall to personally visit his many friends in the textile industry in the New England states.

● RICHARD HAWORTH MOVES

Richard Haworth has recently moved from 25 Fountain Street, Providence, R. I., where he has been located for nearly 16 years, to 266 South Water Street, where he will occupy an entire floor with a total area in excess of 10,000 square feet. The floor is laid out in two large offices, with laboratory and warehouse facilities, together with private freight elevator.

The organization will continue with the same personnel. Mr. Harry Leach who has been associated with Mr. Haworth for over twelve years will cooperate in contacting the trade. The new offices face the docks which were condemned due to the ravages of the recent flood and when these are removed the new offices will face a beautiful boulevard which the City of Providence plans to establish within the next few months.

● ALROSE PERSONNEL CHANGES

Dr. Otto Stein, formerly Research Chemist for Röhm & Haas and recently with A. Th. Boehme of Germany, has accepted a position as Research Chemist with the Alrose Chemical Company of Providence, specializing in synthetic chemicals for the textile trade. Dr. Preston Slachman has been promoted as Plant Manager and Mr. Louis Corman, Research Director.

Mr. Albert Darby, formerly with Esmond Mills, is continuing his research in the application to new textile uses of synthetic chemicals developed by the Alrose Chemical Company. Mr. Mark Weisberg continues as president and general manager.

● JOINS QUAKER CHEMICAL

Mr. Albin Johnson has joined the Technical Development staff of Quaker Chemical Products Corp., Conshohocken, Pa. Mr. Johnson had his technical background abroad, being a graduate of Oslo, Norway, University in Chemical Engineering, and is an American citizen.

Since coming to this country, Mr. Johnson was vice-president of the Pierce-Johnson Laboratories, doing development work in textile oils and plasticizers. He later connected with General Plastic Company on resin development and plastics, later joining the research staff of the Duffy Silk Company. From there he became associated with the research staff of E. F. Houghton Company. Mr. Johnson has spent considerable time in the States, Canada and abroad as technical consultant on products he has developed for direct knitting of hosiery and is now specializing in the hosiery field and the application and development of products for that field. He has for some months been developing, in conjunction with the Gotham Silk Hosiery Company, the use of an entirely new type product for direct knitting, which development, it is believed, will be most interesting to the knitting trade when released in the near future.

● ACQUIRES MAGNESOL CORP.

Westvaco Chlorine Products Corporation announces the acquisition of control of The Magnesol Company, a company manufacturing a line of products used for purifying oils and solvents. Although the use of "Magnesol" products is at present confined chiefly to the petroleum and dry cleaning industries, these products have created considerable interest in other fields which are being actively investigated by Westvaco. The officers of the new corporation are: Maurice E. Gilbert, president; Louis Neuberg, Albert M. Pitcher and Max Y. Seaton, vice-presidents, and William N. Williams, secretary-treasurer.

● OPENS GREENVILLE OFFICE

The Aridye Corporation, Fair Lawn, N. J., announces the opening of a new office in Greenville, S. C., with C. M. Robbins in charge. Also associated with this office are W. B. DePass and C. H. Patrick. Aridye's address in Greenville is 201 Allen Building.

● NEW GRADUATES JOIN du PONT

Approximately 150 new graduates of American technical schools will join the du Pont Company during the summer, the company's Personnel Division announced recently.

Collectively, they will represent more than forty-five universities and colleges, including many of the country's leading institutions of higher learning. They come from most of the states and are about evenly divided between large cities and small communities.

If the next thirteen years follow the precedent set by the last thirteen, the Division states, about three out of every four of the group will still be in the du Pont employ in 1952, at which time many of them will be at work on projects and products now unknown.

The company reports 1939 has been a good year for the technical school graduate. In addition to the 150 employed, it has engaged 35 technical school men temporarily at its exhibits at the New York and San Francisco World's Fairs and at Atlantic City. Some of these men, it hopes, will be permanently retained.

The typical graduate who found employment with the du Pont Company in 1939 was:

1. In the upper third of his class.
2. Active enough outside the classroom to have had varied human contacts.
3. Of good appearance and health.
4. With understanding of the value of money.

5. With previous part-time working experience.

In rating candidates, points which influenced the Personnel Division included energy, command of English, initiative in conversation, aggressiveness, personality, poise and manner. The interviewers also sought answers to such questions as to whether the candidate inspired confidence, seemed determined, and the degree of his interest in the work he had chosen to undertake. Both first and final impressions were noted.

The company announces that its 1939 college recruiting program is now complete. Visits to colleges will be resumed in the fall to interview 1940 candidates.

• MILLER JOINS HERCULES

Hercules Powder Company has announced the addition of N. Judson Miller to the sales staff of its Providence Drysalters Division to serve the textile industry in North Carolina and South Carolina. Mr. Miller has headquarters at the branch office of the Naval Stores Department of Hercules Powder Company, located at 615 Johnston Building, Charlotte, North Carolina. He will reside at 1309½ East Boulevard, Charlotte.

For the past several years, Mr. Miller, a native of Columbia, S. C., has been a broker for textile chemicals and supplies in the south. He brings to his position with Hercules a wide acquaintance in the textile industry and experience in the use of Providence Drysalters chemicals in textile finishing plants.

• ROYCE CHEMICAL TENTH ANNIVERSARY

Royce Chemical Company, Carlton Hill, N. J., recently celebrated its tenth anniversary in business by giving a dinner-dance for its employes at the Colonial Inn, Singac, N. J.

Twenty-four men and women were presented with ten-year service pins and twenty-four were presented with five-year pins. There were 125 at the gathering, many of the wives of the 80 employes being present.

The company was founded in 1929 by Albert J. Royce, of Rosemawr, its president and general manager. Previously, for twelve years, Mr. Royce had been with Jacques Wolf & Company. The company, which occupies part of the Standard Bleachery plant in East Rutherford, close by the Erie's Carlton Hill station, manufactures chemical specialties for the textile and tanning industries, shampoo oils and household cleaning products.

Serving with Mr. Royce on the board of directors are John Ackerman of Passaic, treasurer of Royce Chemical and president of Arrow Carrier Corporation; Abram Prieskel, former Passaic Commissioner; J. Clinton Cadmus, of Passaic, vice-president; Robert Griffith, of Carlstadt, secretary; George Whitehead, secretary of Arrow Carrier; Frank Davies, of the Paterson law firm of Davies and Davies; and Mrs. Lillian Williamson, secretary to Mr. Royce.

His employes presented President Royce with a diamond service pin. To J. Clinton Cadmus, vice-president, was given a pen and pencil set; to Robert S. Griffith, secretary, a belt and tie set. Flowers were also presented by the company's employes.

• GEIGY RELEASES

Geigy Co., Inc., 89 Barclay St., New York City, announces release of circulars describing the following products:—

Diphenyl Fast Yellow RL—a new addition to the Geigy line, possessing fair resistance to light and producing bright, reddish shades of yellow. It is said to be very level dyeing and can therefore be applied to all forms of cotton and viscose rayons. It is further said to have good affinity for animal fibers and is consequently suitable for dyeing real silk, in addition to its giving solid shades on union fabrics consisting of cotton or rayon and wool or real silk. It is claimed to have good dischargeability and can therefore be used satisfactorily when this requirement is to be considered. Circular No. 978.

Erio Chrome Blue 2GL—a new, homogeneous, level dyeing chrome color which is applied according to the top chrome (or after-chroming) method. Very pleasing shades of blue-greys are said to be produced when this color is dyed in weaker percentages. It is recommended by the manufacturers for most all types of fast wool dyeing. It is stated that because of its very desirable characteristic of reserving silk thread effects, it should prove very useful for dyeing silk-white piece goods for men's wear. It is said to have excellent resistance to light, even in light depths. Shades produced with this color are practically unaffected under artificial light. Circular No. 306-D.

• PEROXIDE BULLETIN

A bulletin entitled "Determination of Hydrogen Peroxide and Some Related Peroxygen Compounds" is available from the Peroxygen Products Division, The R & H Chemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. This bulletin represents a reprint from the April 15th, 1939, Analytical Edition, *Industrial and Engineering Chemistry*.

• PROMOTED TO LIEUTENANT COLONEL

Dr. Walter M. Scott, Consulting Chemist with Gustavus J. Esselen, Inc., has been promoted to the rank of lieutenant colonel in the Chemical Warfare Reserve. His assignment, in event of war, would be chief of the Technical Division of the Boston Chemical Warfare Procurement District, which includes all of New England.

• BOOKLET ON DYES

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has recently published a booklet on dyes which corrects certain common misconceptions and presents other points of practical information. Written for the layman, rather than for technical use, it nevertheless is of interest to all who handle dyestuffs. Copies are available upon request.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Chemist and Dyer. Have ten years' experience with large dyestuff manufacturer. Also ten years' experience in the textile industry including the dyeing of acetate-rayon and silk crepes. Recently employed by pile goods manufacturer in making non-crush velvet. Write Box No. 193, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Textile chemist, 33 years of age, married. Textile Chemistry and Dyeing Course, Lowell Textile Institute. 11 years' experience in leading dyeing, printing and finishing plants. Knowledge of textile chemical and dyestuff testing, as well as process development and control. Available immediately due to liquidation of former employers. Write Box No. 166, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.